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Failure of Blast Furnace Stock Line Brick

Carbon Deposition Was the Immediate Cause and That in Turn Was Due to the Use of War Scrap in the Charge

BY L. P. ROSS*

IT is generally conceded by all furnace managers that the stock line is one of the most important parts of the blast furnace. It is essential, first, to have the diameter at this point correct in its relation to the other dimensions of the furnace; second, to maintain it to obtain uniform and satisfactory results. Much thought has been given to proper protection of this part of the furnace. Various forms of protection have been developed, and the problem of protection against abrasion from the stock has been quite generally solved.

Stock Line Plates

As the result of the experience of the writer more than ten years ago at the Cranberry Furnace, Johnson City, Tenn., the Northern Iron Co. since 1908 has been using at its Standish furnace, Standish, N. Y., and later at its Port Henry furnace, angle plates to protect its stock lines. The plates are 6 in. wide, ¾ in. thick, 19 in. long, bent to form an angle of 13½ in. x 5½ in. These plates are built into the brick work the 13½-in. way, and the 5½-in. way they extend down over two courses of brick; and when laid in rows around the circle of the furnace they form a completely armored stock line. Being small in size they afford a minimum of expansion and contraction. This style of protection has given most excellent results against abrasion. In point of fact, blasts have been made three years on a set of these plates, and a large number of those were removed and used in relining the furnace.

Following the outbreak of the war, and especially after the entry of the United States, there was suddenly an abnormal demand for low phosphorus iron, such as was produced at the Standish and Port Henry furnaces. Owing to the suddenness of the demand for increased production and to scarcity of labor, the normal supply of low phosphorus ores was inadequate for the larger tonnage required. This necessitated the use of supplemental low phosphorus material, which fortunately, owing to war conditions, was obtainable in the shape of low phosphorus turnings produced by manufacturers of shells.

Repeated Stock Line Trouble

There had been no trouble with the stock lines prior to the use of shell turnings. But in three months after they were put on the furnace, one of the stock lines had to be renewed. This was followed by repeated stock line trouble at both furnaces, and various explanations as to the cause were offered, such as poor brick, poor brick laying, etc.

On one occasion the brick on one side of the stock line were destroyed in about three months after relining. In tearing out to make repairs, the condition of the brick was carefully observed. It was found that on one side the brick were completely disintegrated, while on the other side and above the level of the stock they were free from disintegration and in good condition. This seemed to disprove the theory that the quality of the brick was responsible for the trouble. At any rate, it was natural to assume that if the brick were poor they would have given way all around instead of on only one side of the furnace.

Following this experience and in just a year after completely relining the other furnace, stock line trouble developed. Upon carefully examining the brick as they were being removed (such as were left), it was found that they were in the same condition as the ones just mentioned—disintegrated and thoroughly permeated with fine, solid carbon. But in this case it was found that the brick were disintegrated uniformly around the furnace and to about the same depth as in the case before mentioned, from a point where the stock struck the stock line to a point 15 ft. below the closed bell.

Brick Not Alone Under Suspicion

An investigation was begun to ascertain the cause of the trouble. As will be noted from the above, the brick were disintegrated and contained quantities of solid carbon. The protecting plates showed carbon absorption, as well as being covered with a thin film of carbon.

Investigation was begun to ascertain why, with practically the same operating conditions (except the introduction of shell scrap), this trouble should have developed so suddenly and continued over such a long period. It was evident that it was not due to the brick alone, for, as will be noted above, in one case where it was found that most of the gas was passing up one side of the furnace, the brick were disintegrated on that side only. The brick used when the trouble first developed were the same as had previously given good results and were made prior to the war and under pre-war conditions.

All furnace records were carefully analyzed, and

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the only change in furnace practice or raw materials was the introduction of shell scrap into the mixture.

Having made this observation and feeling certain that the trouble was not caused by the physical action of the shell scrap, an analysis was made to determine the effect of it upon the gases. This disclosed the fact that, due to the reduction of ore burden (and stone) to supply the heat to melt the scrap, the gas was greatly enriched in carbonic oxide (the ratio of CO_2 to CO having been raised from 1.83 to 2.87).

Carbon Deposition

An analysis of the fire brick used showed FE_2O_3, 1.57; FeO, 0.90; $Fe_2O_3 + FeO = 2.47$.

It is well understood that Fe_2O_3 exposed to carbonic oxide, under certain conditions, causes deposition of solid carbon, the action of carbonic oxide on the Fe_2O_3 being marked by two phenomena, namely, the removal of oxygen from the iron oxide and the deposition of carbon. On the other hand, according to Bell, who demonstrated experimentally that considerable quantities of carbon may be deposited without the formation of metallic iron, due presumably to a catalytic splitting up of carbonic oxide into carbon and carbonic acid, the reaction being $2\ CO = C + CO_2$.

The most favorable conditions for carbon deposition are:

(a) At temperatures from 450 to 770 deg. F.

(b) In a rapid flow of carbonic oxide.

(c) Where the gas carries a high percentage of carbonic oxide.

(d) Where the iron oxide is exposed under pressure.

In comparing these conditions with the conditions existing during the period under discussion, it was found:

First, that the fire brick contained Fe_2O_3.

Second, that the gas contained an excessive amount of carbonic oxide.

Third, that the brick were affected in a zone where the range of temperature was probably between 400 and 800 deg.

Fourth, that owing to the fine magnetic ores which were used, the gas pressure and velocity were high.

Fifth, that the brick above the level of the stock were not affected.

From these comparisons the following conclusions were reached:

1. Under the then existing conditions, carbonic oxide penetrated the brick through the pores, joints and around the protecting plates.

2. The iron oxide in the brick split up the CO in the gas into iron, carbon and carbonic acid, or through a catalytic action, the carbonic oxide was split up into carbon and carbonic acid, the reaction being very likely, $2\ CO = C + CO_2$.

3. The carbon thus deposited caused the brick to disintegrate.

4. The shell scrap was the primary cause of the failures of the stock lines.

As is noted above, the brick were intact above the level of the stock. This was attributed to the slow velocity of the gas and low top pressure, thus allowing the gas to escape through the downcomers rather than to penetrate the brick.

As there is not likely to be another world war, resulting in large supplies of munition scrap, at least during the present generation, this article may not be of special value, but it is believed that it will at least be of interest, particularly to those who may have had similar experience during the period of the war. Furthermore, the facts given would seem to emphasize the importance of using brick in the vicinity of the stock line as nearly as possible free from oxide of iron. Where the stock line protection is built into the brick work, it should be so designed and so built in as to preclude, as far as possible, any joints or cracks through which the gas might enter the brick work.

The above observations may also be of interest to blast furnaces which still use considerable quantities of turnings and borings in regular practice.

Builds Hotel for Employees

The New Departure Mfg. Co., Bristol, Conn., maker of New Departure ball bearings and coaster brakes, is going further than most manufacturers in the solving of housing difficulties. The company has already built over 100 houses on one tract, furnishing homes for 176 families, and has a majority interest in another Bristol enterprise which has constructed about 200 houses and will erect that many more before its full program is completed. These houses take care of present needs so far as employees with families are concerned.

In this factory, however, there is a very considerable proportion of its employees who are single men, and it is for the accommodation of these in a city whose rooming capacity has been exhausted that the New Departure company has undertaken the building of a hotel. While this project is unique in that section of New England, it is by no means an experiment so far as the company is concerned. Several years ago the company purchased the leading hotel in Bristol and made of it just such an institution as is now being developed and constructed on a larger scale. Both sleeping and eating accommodations are provided practically at cost, taking into consideration, of course, the investment and overhead as a factor.

The new hotel will be upon the same basis. It will contain something like 300 rooms with a maximum capacity for 600 men, placing two men in a room. Each room will be well heated, ventilated and lighted, with windows opening to the outside. In the basement will be bowling alleys, pool room and barber shop. The first floor will be devoted to a large lobby or lounge with a cafeteria that will accommodate 600 persons. The second, third, and fourth stories will be utilized for sleeping rooms. On the fifth and top floor will be a club room for the foremen, with assembly hall accommodating 300 persons, kitchenette and dining facilities, together with a few sleeping rooms where guests of the company can be entertained. The floors will be connected by two elevators and the equipment throughout will be thoroughly modern.

The company already has under way extensive additions to its plants at Bristol, Hartford, and Meriden that will mean the employment of 3000 additional employees before summer and the housing and boarding accommodations provided by the present program will be quickly absorbed.

Webbing for Box Handles

To conserve shipping space, box and crate handles made of webbing are recommended by the National Foreign Trade Council as the result of experiments by the United States Forest Products Laboratory. Boxes loaded with 200 to 300 lb. usually have handles made of rope, which increases the displacement and export rates. The laboratory suggests using webbing ⅛ in. thick and 1⅛ in. wide, which has a breaking strength of 800 lb. This may be inserted through saw-cuts in the box ends, turned down flat inside, and nailed securely with large-headed roofing nails.

The Standard Tank Car Co., Sharon, Pa., has practically closed with the French government for 500 tank cars.

Design of Open-Hearth Furnaces*

Conditions Governing the Flow of the Burning Gases Along the Hearth of the Furnace

BY A. D. WILLIAMS

ONE feature of the open-hearth and similar furnaces that has caused sorrow and tribulation is the bottom of the furnace in that it forms a valley below the level of the port sills. One of the basic principles of furnace design is: The flame must lick the hearth or bottom of the furnace. The gas pressure in the heating chamber must be equal to the atmospheric pressure. This last means that a nice balance must be maintained between the volume of gas and air entering the chamber and the gases removed from the chamber. When the pressure in the furnace is permitted to drop below the atmospheric pressure cold air will tend to flow into the furnace around the doors

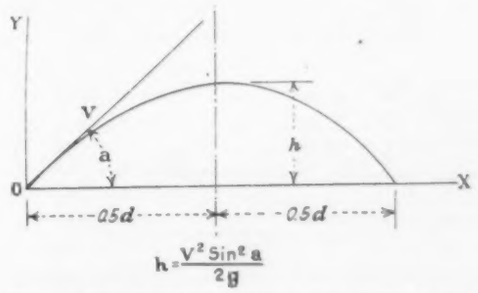


Fig. 6—The Parabolic Curve of an Inclined Jet

and through all cracks and openings. This chills the bath and causes excessive oxidization to occur.

It is well known that when patching bottom it is necessary to keep the doors closed as much as possible in order to avoid chills, which are liable to develop into cracks and leaks in the bottom. Many beautiful octahedral steel crystals have been discovered in tearing out old furnace bottoms.

When the pressure in the furnace gets higher than the atmosphere a sharp sting of flame is developed and fuel must be burned to maintain it. Some melters and many heaters keep the doors of their furnaces decorated with a halo of flame. In some cases it is necessary to maintain this sting owing to the defective design of the furnace. There is no question whatever that this method of working will prevent cold air being drawn into the furnace. It is "the easiest way"; the company pays for the excess fuel, and the melter or heater has plenty of time to sit down and "watch 'er burn." In foreign plants the technical control of the furnaces is more closely maintained than in this country because fuel is expensive.

In order to cinter the bottom of the furnace in place it is necessary to direct the jet of flame so that it will lick the hearth. In order to do this the air and gas ports must be given a suitable inclination toward the hearth and the velocity of the flame must be sufficient to carry it down onto the bottom. The velocity which will be impressed upon the jet of air entering the furnace will be fixed by the height from the bottom of the regenerators to the port and by the area of the port and the flues leading to it. In the case of the gas a slightly greater head is available as it enters the regenerator under pressure from the producer. The gas pressure can be increased and usually is toward the end of a campaign when the regenerators are partially blocked.

The inclination of the ports is fixed when building the heads. It frequently happens that these heads are changed several times before they work in a satisfactory manner. In fact, a number of furnace drawings which have been published show heads which must have been altered considerably in order to make the bottom.

The current of flame in the furnace can be considered as a jet of a light fluid in motion within a heavier liquid (the air). In the case of a jet of water projected vertically, neglecting the friction of the pipe and the air, the height to which the jet will ascend will be equal to the vertical head causing the hydrostatic pressure. That is:

$$H = h = \frac{v^2}{2g}$$

In which: H = head of water; h = height jet rises; v = initial velocity of jet; g = gravitational constant.

If the jet is inclined it describes a parabolic curve, Fig. 6, the height or maximum ordinate of which will be:

$$h = v^2 \sin^2 a \div 2g$$

In which: a = the angle of projection, the other symbols being, of course, the same as in the formula for the vertical jet.

When this is applied to a jet of flame, that is to say, a light fluid in motion within a heavier fluid, the parabola must be inverted. The force which acts upon the jet is not its weight, acting in a downward direction; but the difference in weight between a unit volume of the fluid in motion and a corresponding volume of the medium through which it moves. That is the resultant force upon the jet acts in an upward direction, and it describes a parabola, as shown in Fig. 7.

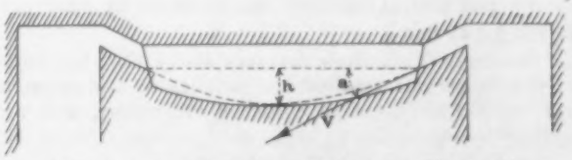


Fig. 7—The Inverted Parabola of a Flame in Making Bottom

Professor Yesmann has given the following expression for an infinitely thin jet projected from the port of an open hearth furnace:*

Let:

v = initial velocity of the fluid in motion;
p_m = specific weight of the fluid in motion;
p_i = specific weight of the fluid at rest.

The weight of each unit volume of the fluid in motion being less than p_i, the ascensional force which acts upon each unit of volume is equal to $p_i - p_m$. The acceleration caused by this force is:

$$\frac{p_i - p_m}{p_m} = g$$

The middle ordinate or depression of the jet for this condition is:

$$h = \frac{v^2 \sin^2 a}{2g} \times \frac{p_m}{p_i - p_m}$$

When developed and simplified this formula becomes:

$$h = \frac{v^2 \sin^2 a}{2g} \times \frac{273 + t_i}{t_m - t_i}$$

And for a vertical jet, or when $a = 90$ deg.:

$$h = \frac{v^2}{2g} \times \frac{273 + t_i}{t_m - t_i}$$

*Copyrighted, 1920, by A. D. Williams. Second article, the first covering hearth dimensions, appearing in issue of Jan. 1.

*Fours a Flamme, by Prof. Groume-Grjimailo, p. 56 and following.

In which:

t_m = the temperature in degrees centigrade of the gas in motion;

t_i = the temperature of the gas at rest.

In the open hearth furnace the ports are just below the roof, and the hearth forms a pocket below the level of the port and door sills and above the level of the tapping hole. This pocket will become filled with the coolest gases in the heating chamber. In order to sweep these gases out of the pocket and permit the cintering of the bottom of the furnace in place it is necessary to utilize the jet of flame issuing from the ports. This jet must describe a parabola having a middle ordinate equal to the vertical distance from the tapping hole to the port sills. In the earliest types of open hearth furnace it was endeavored to attain this result by depressing the roof of the furnace. The serious objections to this poor construction arose from its tending to strangle the furnace during the heat and the extremely short life of the roof. Later experience showed that the flame might be jetted into this pocket by the direction of the ports and the velocity of the gas and air. In European furnaces these velocities range between 12 and 18 meters (40 to 60 ft.) per second, while in American furnaces the velocity is as high as 50 meters per second.

If the jet theory is true, all open hearth furnaces in operation will conform to it. The air and gas entering the heating chamber of the furnace are preheated to a temperature of between 1000 and 1200 deg. The theoretical flame temperature under these conditions is between 2100 and 2200 deg., but the Wanner pyrometer indicates a temperature of 1800 to 1850 deg. for the jet of flame. Knowing the quantity of fuel which is transformed into gas in the producer, it is not difficult to approximate the volume of gas supplied and the amount of air necessary for its combustion. From these data the velocity of the gas and air issuing from the ports may be computed.

For example, a 30-ton furnace making four heats per day, consumes 0 kg. 347 of coal per second. At zero temperature and 760 mm. atmosphere pressure this corresponds to 1 m.³ 81 of gas and 2 m.³ 52 of air per second. At a temperature of 1000 deg. the volumes of gas and air entering the heating chamber will be respectively 8 m.³ 44 and 11 m.³ 77. The combination of the gas and air gives a temperature of 1850 deg. to the jet of flame.

Professor Yesmann's formula shows that the value of h will become smaller and smaller as the gases at rest within the heating chamber are colder, and will become infinite when $t_m = t_i$. In this case $t_m - t_i = 0$.

Those who are familiar with the starting up of a furnace are familiar with the fact that when a furnace

Table V—Applying Yesmann Formula to Designs of 30-Ton Furnaces

No. of Furnace in Album	Area of Gas Port	Velocity of Gas at 1000°, V_g	Area of Air Port	Velocity of Air at 1000°, V_a	Inclination of Gas Port, A_g	Inclination of Air Port, A_a	Resultant Angle of A3 and A_a	Resultant Velocity of V_g and V_a	Distance of Tapping Notch Below Port Sill	Minimum Temp. of Immobile Gas
	Sq.M.	M./Sec.	Sq.M.	M./Sec.	Deg.	Deg.	Deg.	M./Sec.	Mm.	Deg.
20	0.285	29.6	0.54	21.8	15	38	27	24.0	1150	74
21	0.358	23.5	0.57	20.6	13	40	29	21.2	980	58
23	0.440	18.9	0.72	16.3	33	33	33	17.3	980	22
24	0.260	32.4	0.56	21.0	10	38	25	24.5	1020	70
25	0.320	26.3	0.64	18.4	15	41	29	21.0	1370	158

is cool the flame bathes the roof of the furnace, and that it drops lower and lower as the temperature in the furnace increases, the drop of the flame being a good indicator of the progress of the heating up of the furnace. A basic bottom cannot be thoroughly burnt in unless the temperature is 1600 to 1700 deg., and it cannot be done unless the flame licks the hearth of the furnace.

Professor Pavlow, in his "Album de Dessins Concernant la fabrication de l'acier Martin" gives the drawings of a number of open hearth furnaces. Applying Professor Yesmann's formula to the 30-ton furnaces enumerated in Table V, the velocities given in columns 3 and 5 are obtained. Columns 8 and 9 give the resultant angles and flame velocities. The last column gives the minimum temperature of the gases in the heating chamber at which the jet of flame will lick the bottom.

Except in the case of furnace No. 23 the jets of air and gas have different velocities and slopes; the mass of the air and the gas is also different. When the velocities and inclinations of the two jets forming the flame are different their resultant must be obtained by the parallelogram of velocities, in which the velocities of the air and the gas are multiplied by coefficients proportional to their weight and temperature. This resultant is then used in Yesmann's formula to determine h or the minimum temperature at which the flame will reach the bottom of the furnace.

In these 30-ton furnaces it is evident that the heads

Table VI—Two 60-Ton American Furnaces Analyzed

	No. 35	No. 36
Area of gas port, sq. m.	0.7300	0.3935
Velocity of gas in port, m. per sec.	23.70	42.90
Area of air port, sq. m.	2.70	3.75
Velocity of air in port, m. per sec.	6.20	6.28
Inclination or slope of gas port, deg.	6	12
Inclination or slope of air port, deg.	17	26
Drop of flame=difference in elevation between port sill and tapping notch	0.920	1.000
Resultant velocity of flame, m. per sec.	11.80	20.50
Resultant slope or flame angle, deg.	9.5	14.5
Temperature at which flame commences to lick bottom of furnace, deg. C.	1531	646

give a velocity and slope to the flame which bring it down to the bottom very quickly, and while other portions of the furnace will still be at a low temperature. This is very useful when making bottom or patching, but has disadvantages when melting and refining.

Furnaces 35 and 36 in Professor Pavlow's album are two American 60-ton furnaces. The hearths are long. The heads as shown have a very slight slope, and the velocity of the air is low and that of the gas high. At a temperature of 1000 deg. the volume of the air and gas supplies is respectively 23 m.³ 54 and 16 m.³ 88. Table VI gives the data regarding the ports and the temperatures at which the jet of flame commences to lick the bottom of the furnace.

This calculation shows that the cintering of the bottom in furnace No. 35 would be extremely difficult. It is very possible that the published drawing of this furnace is incorrect.

Furnace No. 36, however, should not give any difficulty in the making of the bottom and the flame impinging upon the surface of the bath will not be driven or reflected back against the roof of the furnace. When this furnace is in operation erosion will occur in the gas port and it is desirable to learn to what extent this erosion may proceed or how much the velocity of the gas may diminish before it will commence to interfere with the patching of the bottom. Assuming that during the time the gas is off the gases in the heating chamber may drop to 1400 deg. without interfering with the cintering. The flame velocity may drop to 9.2 meters per second. With the original port section the flame velocity was 20.5 m. per sec. By proportion it may be seen that the area of the gas port may increase to 2.2 times its original section before it will be necessary to repair it.

(*To be continued*)

Measurement of Rolling-Mill Reactions

Apparatus for Accurate Determination of Friction Losses on Roll Necks and Spreading Forces on Rolls and Roll Housings — Loads

BY W. B. SKINKLE*

THE great need of accurate knowledge of the forces acting on rolls and the friction losses on roll necks in different types of rolling mills has prompted the design and construction of a mechanism herein described, and which is soon to be tried out on the experimental rolling mill of the bureau of rolling mill research at the Carnegie Institute of Technology, Pittsburgh.

By means of this equipment it is expected that experimental data will be secured that will give positive, accurate knowledge, not only of the relative values of the various lubricants and bearing metals used on roll necks, but also of the spreading forces acting on the rolls, from which the stresses in rolls and housings may be calculated to a far greater degree of accuracy than is at present possible.

The device consists of two hydraulic supporting cylinders marked No. 1 and No. 2 in Figs. 1 and 2, located in the bottom of the roll-housing window and so arranged that they can easily be removed and replaced by a filler. The carrier for the bottom roll rests on the plungers of these cylinders in such a manner that the forces acting on the roll neck are recorded by the resulting hydrostatic pressure in these cylinders.

Fig. 1 shows a diagrammatic arrangement of these cylinders and their relation to the rolls. It shows a bloom between the upper and lower rolls with the lower roll carrier and cylinders. The full lines show the position of this carrier under static conditions (condition of rest). The conditions existing at the lower roll neck being greatly exaggerated for the purpose of illustration.

The total spreading force F†, due to the bloom pinched between the rolls, will cause a heavy force P, to be applied about as indicated in Figs. 1 and 2. Under static conditions this force would be transmitted from the roll body to the neck and would be applied to the bearing as indicated by the arrow "A" in Fig. 1. Such an application of forces would cause one-half the load *P*, on each bearing, to be carried by cylinder No. 1 and the other half by cylinder No. 2.

The proportion of the total force F, which is distributed to each neck of the rolls will depend on the location of the pass in the roll body and can readily be figured by the well-known principles of beam reactions.

Where rotation starts, and the bloom is being rolled, the point of contact between roll neck and bearing changes to some other point, the force *P* is then ap-

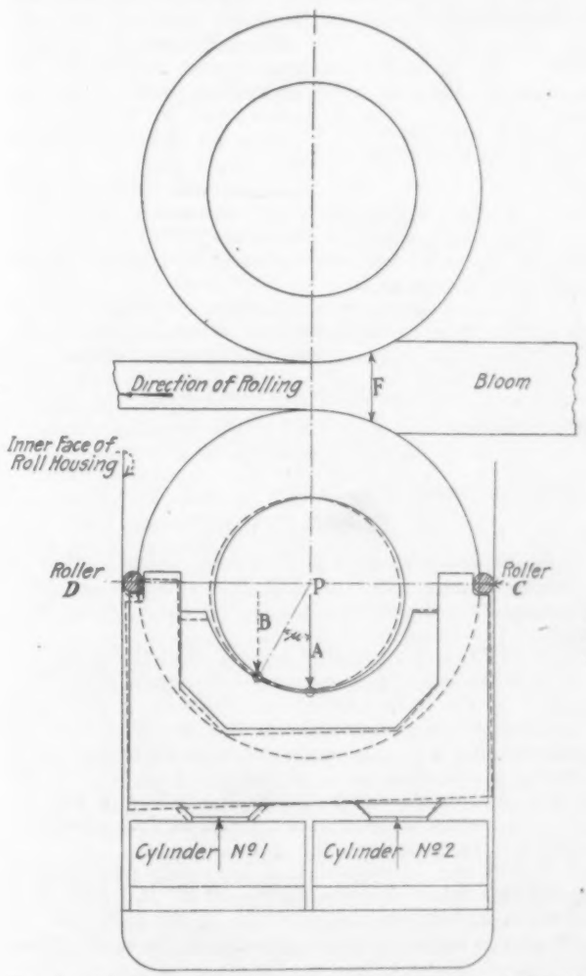


Fig. 1.—Diagrammatic Arrangement of the Two Hydraulic Testing Cylinders and Special Roll Carrier with Roller Bearing on Inner Face of Roll Housing

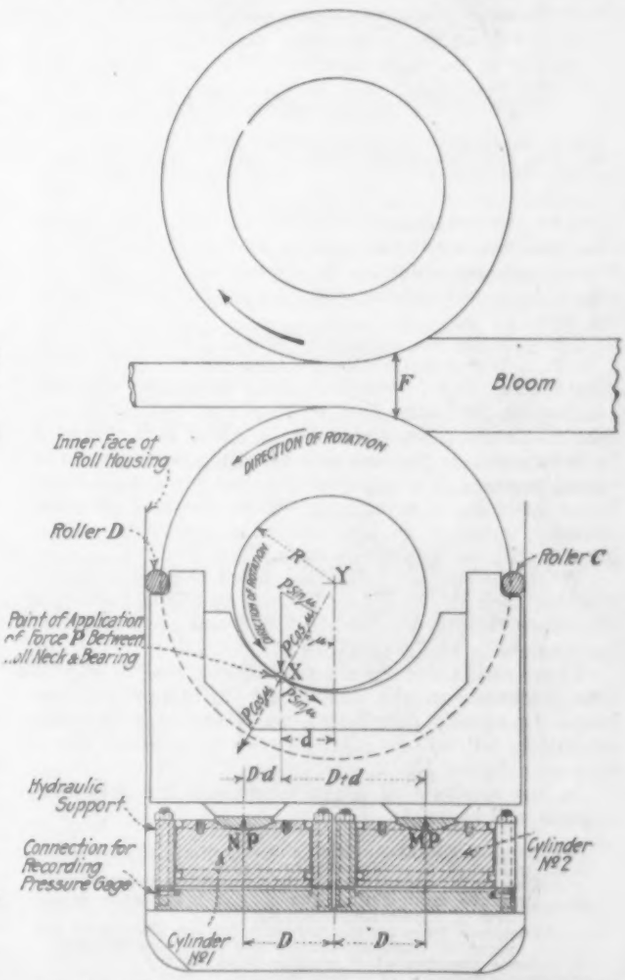


Fig. 2.—Analysis of Force "P" Applied at Point of Sliding Friction, "X," Between Roll Neck and Housing. Hydraulic cylinders shown in section

*Director, bureau of rolling mill research, Carnegie Institute of Technology, Pittsburgh.

†It is not the purpose of this article to enter into a discussion of the complicated system of forces acting at the contact surfaces between rolls and bloom. Inasmuch as the rolls are able to move up or down and are restrained from horizontal movements in any direction by the bearings and roll housing, the resultant of all forces acting must be in a vertical direction.

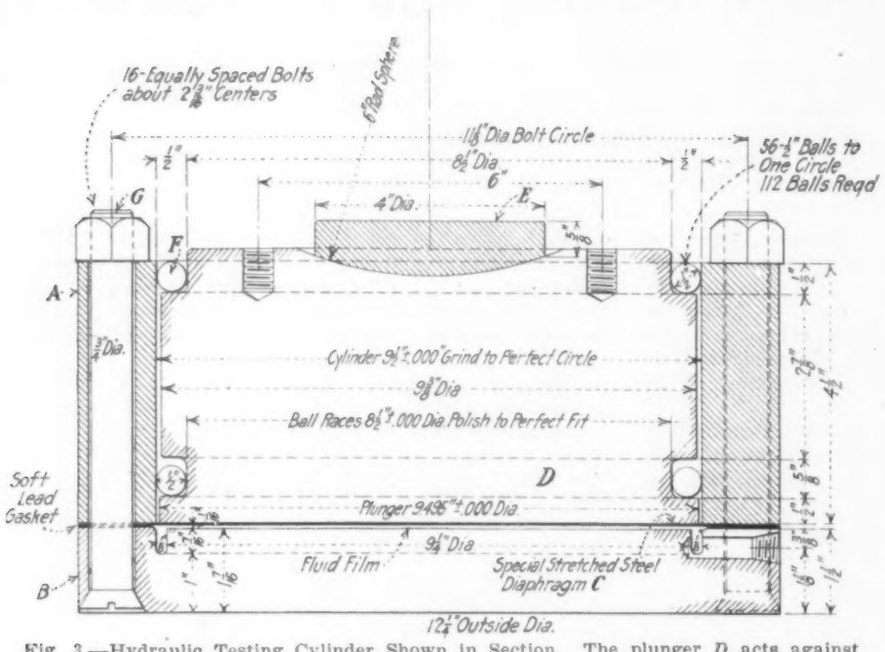


Fig. 3.—Hydraulic Testing Cylinder Shown in Section. The plunger *D* acts against the thin steel diaphragm *C* upon the fluid film beneath, which is connected directly with a pressure gage

plied to the bearing as indicated by the dotted arrow "B," and the lower roll carrier has a tendency to assume a position indicated by the dotted lines, using the roller "C" as a fulcrum point; the roller "D" lifting off its seat.

The position indicated by these dotted lines in Fig. 1 is of course greatly exaggerated for the purpose of illustration. It is, however, vitally important that the bearing be perfectly free to rotate as indicated, and that no forces other than the cylinders Nos. 1 and 2 be interposed to prevent this rotating tendency. (In actual practice it is expected that not more than 0.003 in. or 0.004 in. of movement will be obtained on these cylinders between no load and their maximum carrying capacity of 250,000 lb. each.)

When the contact point has moved to a place where it slides back as rapidly as it tends to climb, the angle of sliding friction has been reached and a condition of equilibrium is again established.

These conditions are shown and analyzed in Fig. 2. The pressures on the supporting cylinders will no longer be equally distributed, as in the case of static conditions, but will be much heavier on cylinder No. 1 than on cylinder No. 2.

In the analysis of these conditions the following symbols will be used:

P = Total resultant force on the roll neck, in pounds.
R = Radius of the roll neck in inches.
μ = The angle whose tangent is the coefficient of friction.
D = Distance from center-line of roll housing to center line of supporting cylinder.
d = Distance from center line of roll-neck bearing to the point of contact between the neck and bearing.
N = Some fraction of P greater than ½.
M = Some fraction of P less than ½.

If equilibrium in a "free body" is maintained, the following conditions must be met:

1. The sum of all horizontal or vertical forces acting on the body must be equal to zero.

2. The sum of the moments of all forces acting on the body taken about any point must equal zero.

Fulfilling the first condition, as applied to the vertical forces on the lower roll-neck bearing, we have

$$-P + NP + MP = 0$$

then $NP + MP = P$, and cancelling the P's, we have

$$N + M = 1$$

This shows that for each increase over ½ of the total load carried by cylinder No. 1 there is a corresponding decrease in the load carried by cylinder No. 2 and that the sum of the pressures on cylinders Nos. 1 and 2 must be equal to the force P. This same fact can be shown by taking moments about the point X where the roll neck applies its load to the bearing. In this case the force P has no lever arm. Its moment would therefore be zero, and it may be neglected. Taking moments about X we have

$$+ NP(D-d) - MP(D+d) = 0,$$

which expands into

$$NPD - NPd - MPD - MPd = 0 \quad \ldots\ldots (1)$$

Taking moments about Y, the center of the roll neck, we have

$$-Pd + NPD - MPD = 0 \quad \ldots\ldots (2)$$

Subtracting equation (2) from equation (1) we have

$PD - NPd - MPd = 0$; or $NPd + MPd = Pd$; and, cancelling the P d's, we have $N + M = 1$.

The force P applied at X may be resolved into its component forces, one normal to the tangent of the contacting surfaces and the other parallel to this tangent. As shown in Fig. 2 the force normal to the tangent will be equal to $P \cos \mu$, and the tangential force will equal $P \sin \mu$.

These two component forces may then replace the original force P and are indicated by dotted arrows applied to the point X.

If moments are now taken about the point Y it will be noticed that the force "$P \cos \mu$" has no lever arm, therefore a zero moment, and the equation becomes

$$-P \sin \mu R + NPD - MPD = 0,$$

or by transposing

$$P \sin \mu R = NPD - MPD$$

and by rearranging we have

$$P \sin \mu R = (NP - MP)D \quad \ldots\ldots (3)$$

In the above equation NP is equal to the total pressure on cylinder No. 1 and MP is equal to the total pressure on cylinder No. 2; also D is equal to the lever arm of *one* cylinder.

It will therefore readily be seen that the difference between the total pressures on the cylinders, when multiplied by the lever arm of *one* cylinder, is the exact measure of the resisting forces due to friction on the roll neck and it is only necessary to multiply this quantity by the surface speed of the roll neck in feet per minute and divide this result by the radius of the roll neck, in inches, to secure the number of foot-pounds of work lost in friction at this point.

It will also be noticed that it is only necessary to divide this same quantity, $(NP - MP)D$, by the sum of the recorded pressures and also by the radius of the roll neck in inches, to obtain the sine of the angle whose

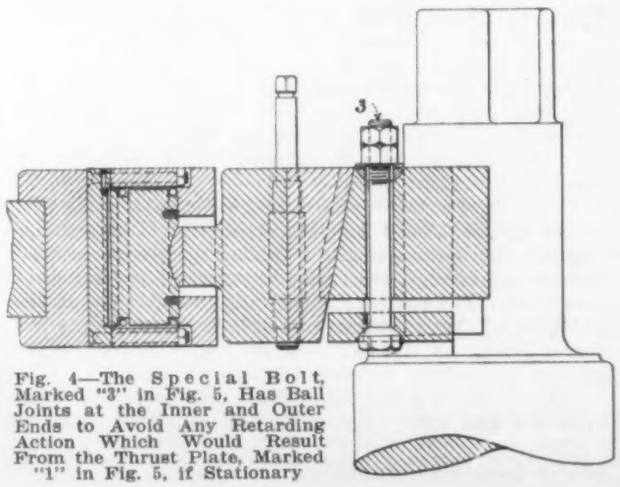


Fig. 4—The Special Bolt, Marked "3" in Fig. 5, Has Ball Joints at the Inner and Outer Ends to Avoid Any Retarding Action Which Would Result From the Thrust Plate, Marked "1" in Fig. 5, if Stationary

tangent is equal to the coefficient of friction between roll neck and bearing. This can be expressed mathematically as follows: Re-arranging equation 3 we have

$$\text{Sin } \mu = \frac{(N P - M P) D}{(N P + M P) R} \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

The sum of these quantities, $N P + M P$, also gives the load applied to the housing which carries that particular roll neck, and by adding these quantities obtained from the corresponding cylinders in the housing on the other end of the roll, the total load on the roll is obtained.

The foregoing is true only if the hydraulic support cylinders are frictionless. If these hydraulic cylinders were of the ordinary hemp-packed plunger type, the results obtained would be almost useless, as the friction of the packing on the plunger would be very large and the exact amount of this friction would be very difficult if not impossible to obtain.

It will therefore be necessary to produce a frictionless hydraulic support cylinder. This, the author believes, has been obtained in the cylinder shown in Fig. 3.

While it is recognized that no machine can be absolutely frictionless, this cylinder so nearly approaches this ideal state, that for all practical purposes it may be considered as frictionless.

The cylinder consists of an upper or guide cylinder "A" securely bolted to its base "B" by 16-in. bolts, "G." The base, which is really the cylinder proper, has a groove, 9¼ in. inside diameter, cut into it. The center portion of the base is then faced off to allow just a film of fluid not over 1/16 in. in thickness to act on a special stretched steel diaphragm, "C," which is securely held in place by the friction between the parts A and B of the cylinder and is made tight on its lower side by a soft lead gasket. By this means the fluid is completely confined in the cylinder, the only escape being through the orifice leading to the recording pressure gage. The plunger "D" never comes in contact with the fluid in the cylinder but rests on the upper side of the steel diaphragm "C." These contacting surfaces must be very flat and true.

In order to avoid friction between the plunger "D" and the side walls of the guide cylinder "A" the plunger is turned ⅛ in. smaller in diameter than the guide cylinder on its upper parts, and 0.005 in. smaller in diameter where it rests on the diaphragm.

In order to prevent lost motion, or the plunger from tilting and shearing the diaphragm, and further to prevent the plunger from getting "off center" and having a rubbing contact with the cylinder walls, two rings, each of 56 steel balls of ⅛ in. diameter, marked "F," are provided.

The inside diameter of the guide cylinder "A" is ground to as nearly a perfect circle as possible and the grooves for the balls are ground and polished to a perfect fit.

When the plunger moves downward, due to the application of a load, these steel balls tend to lift off their seats and establish a rolling contact between the plunger and cylinder walls.

The only friction on this cylinder is the friction of these ball bearings, the internal friction of the steel in the diaphragm and the friction of the fluid on the pipes leading to their recording gages.

These quantities are so small when compared with the maximum load of 250,000 lb., which each cylinder is designed to carry, that they may be neglected.

The displacement of fluid by the plunger when under load is equally small. Marks' handbook, page 251, gives the following information: "A pressure of 1 lb. per sq. in. compresses liquids in volume as follows: Water 1 part in 300,000; mercury 1 part in about 4,700,000. For water in an iron pipe this corresponds to a compression of 2 in. per mile of length for a pressure of 10 lb. per sq. in."

It will easily be seen that such a compression of the fluid will not disturb the roll setting. The only other factors entering into the plunger displacement will be the quantity of fluid necessary to move the needles of the recording gages and the expansion of the short pipes leading to these gages. Both of these factors are so small that they may be neglected.

The idea of this frictionless diaphragm cylinder is not new, but has had several stages in its development. It appears to have been originally invented by Mr. Emery, who first applied it to the well-known testing machine bearing his name. The general application of this invention was delayed by the fact that Mr. Emery measured the pressure in his hydraulic supports by means of a complicated balancing and weighing mechanism. The hydraulic support was made accessible to general use by the research at the German Government materials testing station of Dr. A. Martens, who measured the pressure in the hydraulic support by means of Bourdon pressure gages and who proved conclusively that the combination of hydraulic support and pressure gage forms the most accurate and desirable means for measuring, without friction or lost motion, forces of any magnitude and of any suddenness of application.

Professor W. Trinks, head of the department of mechanical engineering at the Carnegie Institute of Technology, first conceived the idea of applying cylinders of this type to roll necks, sometime early in 1916 and made drawings of a special roll housing for this purpose.

When the author was placed in charge of the organization of the Bureau of Rolling Mill Research and of

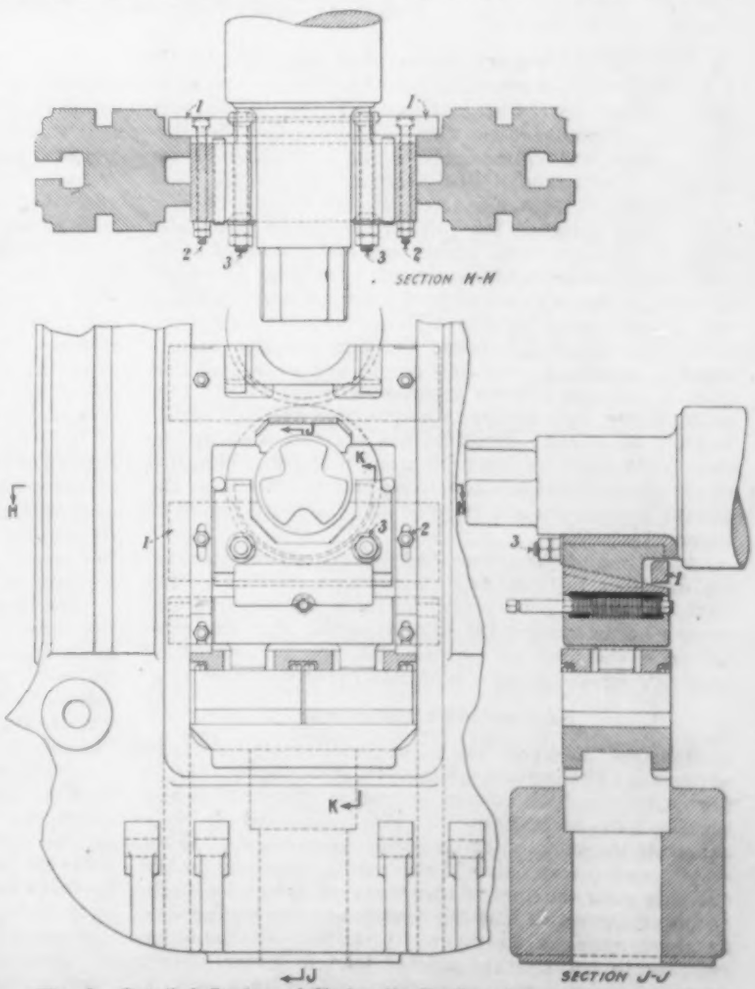


Fig. 5.—Detailed Design of Hydraulic Testing Apparatus as Applied to a Three-High 18-In. Bar Mill

the designs of the experimental mill, he carried the development one step further by designing the present cylinders in such a manner that they would fit in the window of an ordinary roll or pinion housing, and could easily be replaced by a filler casting in case experiments not requiring their use were to be made.

The first cylinder of this type is now in the course of construction and will be carefully tested and calibrated under a 600,000-lb. compression testing machine, before the final design is produced for the experimental mill.

Diaphragms varying in thickness from 1/64 in. to 3/64 in. are on hand and their relative merits together with the relative merits of mercury or water for the fluids will be carefully investigated before the final selections are made.

There is one more important item which should be considered. That is the friction of the end of the roll-neck brass on the roll body.

The "thrust plate" marked "1" in Fig. 5 is held firmly against the inside of the roll housing by the bolts "2" and "3" and, unless a flexible connection between the lower roll carrier and this thrust plate was provided, would offer a very substantial resisting force acting *against* the rotating tendency of the lower roll carrier. To overcome this the bolts "3" are made with ball joints at their inner and outer ends. In this manner any retarding action due to the stationary thrust plate is avoided.

The importance of careful experiments on roll-neck friction will be realized when, according to the best information at present available, between 40 per cent and 50 per cent of the total work of a blooming or bar-mill engine is absorbed in friction which is developed on the roll necks.

These figures represent the best working conditions in rolling-mill practice. For mills, such as plate, skelp or sheet mills rolling wide, thin sections, which are often cold, the work lost in friction on the roll necks is frequently between 70 per cent and 80 per cent of the total work of the engine or motor.

The designs of the experimental mills are being worked out with extreme care, which of necessity involves a slow rate of progress. They offer a great many problems similar to the one just described. It is expected that these designs will be completed sometime during the next three or four months and will be given to the public very shortly thereafter.

The Carnegie Institute of Technology is throwing open to members of the bureau, nearly $400,000 worth of building and equipment, free of all charges for rentals, etc.

More than half the money necessary to add this experimental rolling mill has already been definitely subscribed and the remainder is in sight, approved by officials of many different companies interested, but awaiting ratification of their various boards of directors.

The completion of this experimental mill will make the Bureau of Rolling Mill Research what is probably the largest and most complete steel research laboratory in the world.

Main Hoists for Open Hearth Ladle Cranes

Tests of Two Motors in Series—Reserving One Motor as Spare—Series vs. Parallel Operation

A SERIES of tests and observations made in the main hoists of two overhead electric traveling open-hearth ladle cranes was recently presented by W. W. Garrett, Jr., of the Tennessee Coal, Iron & Railroad Co., Birmingham, before the Philadelphia monthly meeting of the Association of Iron and Steel Electrical Engineers. Tests were made on the main hoists of two cranes, both of which were designed for 150-ton loads with a hoisting speed of 6 ft. per min. The cranes had a span of 65 ft. and were built to handle their rated loads at the center of their girders with a factor of safety of five. Hoisting was accomplished by two 100-hp. (crane rating) size G.W. 450 r.p.m. 220 volts, Crocker Wheeler motors wired in series on a 440-volt circuit and geared so that each motor can operate independently all of the four cable drums, thus giving to each motor one half of the total hoisted load. Braking was accomplished by the use of the standard Reliance friction brake, which will at all times permit the load to be raised, but sets at the instant the motors are stopped and the hoist begins to lower.

After one of the cranes had been in service for several weeks, a full load test employing a ladle of molten steel was made. To start the hoist up required 105 electric hp. as against 136 e.hp. when the crane was new. To raise the load at normal hook speed required 99 e.hp. as against 147 e.hp. when the crane was new.

Hoisting With One Motor

Some of the operating men, Mr. Garrett said, had advocated handling the hoist with one motor. "After the crane has been broken in and as the most severe service will necessitate the rated capacity of only one motor, would it not be better to use one of these motors as a spare only?" they asked. In order to try out this plan the pinion was removed from the shaft of one of the series hoisting motors and the wiring was so rearranged as to make it possible by changing switches to transfer the hoisted load to either motor, reserving the idle unit as a spare. The plan, however, had not been in operation for sufficient time, he said, for data to be available.

In answering the points advanced in favor of using the one motor, Mr. Garrett said he granted that one motor has sufficient power to operate the hoist, but that this motor must run at its full load capacity at all times, consequently the chances for failure are increased. "If one motor is used," he said, "the hoisting speed will be increased about 18 per cent while the no load hook speed will be approximately doubled. This means higher operating speeds under full load conditions and much higher speeds under light load service; hence a marked increase in the general wear and tear of the cranes and a shorter life for the motors. By increasing the hook speed we will save time in handling the steel, but our possibility for delays and accidents will be greatly increased. Since we must have a duplicate motor as a spare to insure positive handling of the steel the intial outlay in dollars will be the same, so we have saved nothing on the investment by the use of one motor. In the scheme of two motors in series, each unit will at all times operate below its rated capacity and at slower speeds, regardless of the nature of the service. Under these conditions we can assume that we have at least doubled the life of the motors."

The speaker pointed out that it might be suggested that one larger unit be used thus to operate the motor below its rating. "Our experience in steel production," he said, "has taught us that by preventing a short delay in which the loss might be only one ladle of steel, we have saved in dollars the price of a spare, hence two motors are carried regardless of the wiring plan."

Relative to the point that the change to the spare unit can be made in a few minutes' time, Mr. Garrett pointed out several objections. These included delay in assembling the men from the various parts of the mill after the accident has happened and their getting ready to make the change; difficulty in working over a ladle of molten steel; and liability of the motor failing to run after being idle for months.

Other advantages emphasized for the use of the two motors in series were: That it is easier to reverse the motors; they have less tendency to race; braking from two separate units is more positive; commutation of

current peaks is more easily accomplished; and the motors in series act as a double booster to the line when the hoist is running down.

It was Mr. Garrett's opinion that the two-motor series scheme is by far the safest, cheapest and most dependable plan. "It may not appear," he said, "to be the most efficient at first glance, but after taking both sides of the question into consideration, I am convinced that it is just as efficient as the less safe plan might be."

Discussion

In a discussion of the paper, George W. Richardson stated that he was in favor of two motors in series. "I have one case," he said, "of two motors working in series. When we bought the crane we had one motor and had a considerable amount of trouble at that time, and we replaced it with two smaller motors, and we have very good results. In fact, we very seldom have any trouble with the hoist motors on that crane, but we also have two speeds on the crane in case we have one motor get out of order. We can throw it over and run one motor and we will still accomplish our work. That is not on our heaviest work, but on the lighter loads. This particular crane I speak of was used for changing loads. We can throw one motor over and run the other motor at reduced speed. That is done by a clutch arrangement. I have seen a number of installations of two motors operating especially on travelling motions, and we find we have far better results from the travelling cranes when we use two motors for travelling motions than we did with one motor."

A. J. Standing stated that "We have operating on 175-ton ladle cranes two 150-hp. motors in parallel on the hoist with switches, provided in control, so that we can cut out either motor in case of trouble with the other one, and the remaining motor will take care of the load. On bridge travel on 10-ton soaking pit cranes we have gone to two motors in series, mounted near end trucks on one side of the bridge, doing away with the motor in the center of the crane span in two cases, and we have better results in that way."

Motors in Series or Parallel

Parallel versus series operation was discussed by R. H. McLain. "Suppose you require 6 ft. per min. hoist speed for your crane, and suppose the actual horsepower is 100 hp. to hoist. It makes no difference as to power input whether you put two motors in parallel or in series. There is a slight difference in efficiency, but we can neglect that. If you take the two 100-hp. motors and connect them in series, you are sending full load current through each motor. Suppose in case of a breakdown on one of these motors it is necessary to cut it out and run with the other motor. Your speed will come up to something like 10 ft. or 11 ft. per min. That would depend on the torque speed curve. If it was 9 ft. per min. you would draw 150 hp. during the emergency and operate at higher speed. Now let us consider the scheme of connecting the two motors in parallel. If you spend the same amount of money for two 100-hp. motors and design your crane to hoist 6 ft. per min., it will take 100 hp. to hoist it just the same. Since you have two 100-hp. motors and only 50 hp. will go through each one of these motors, from a current standpoint and from the standpoint of the torque on the motor, you will be operating at half load on the motors when you have two motors in parallel; whereas, when you have them in series, from a torque standpoint and from the standpoint of the current, you will be operating at full load. That means that the wear and tear on the motors will be greater when you put two motors in series than when you put them in parallel. Also, when you arrive at your emergency and cut one of the motors out all the load goes over to the other motor and the speed will drop down some, say to 5 ft. per min., and you would require that one motor to pull only about 90 hp., which is not up to its full load rating. It seems to me, from all those angles, you will have less strains and loads on your motor when you connect them in series. One thing I have not mentioned, and that is when you connect them in parallel you are always running them at full speed; when in series, at half speed. It is a fact that the higher speed you run, the more damage done. However, there is less damage done running a motor at normal speed and half current than at one-half speed and at normal current.

"When it comes to knocking the bearing caps out, there are several reasons which cause that trouble. Some of them you might call electrical troubles and some purely mechanical troubles. For instance, the brakes might set accidentally, etc. That would be mechanical trouble. The current might not flow through the motors equally. I would call that electrical trouble. Your electrical troubles, as to knocking the caps off the drums, would be less when you have two motors in series, than when in parallel; but the mechanical troubles will be the same. I think it is necessary in any crane like this where so many troubles can happen, that you must have your crane mechanically able to stand any of the troubles. I do not believe it is necessary to worry so much about these electrical troubles, if you have your crane so it can stand them. So, all around, I believe there is a lot in favor of putting two motors in parallel. When you do that, do not buy two 50-hp. motors but buy two 100-hp. motors, and I believe you will have longer life for the apparatus. Of course, if you were going to try to save to the limit and use two 50-hp. motors instead of two 100-hp. motors, then when the emergency comes you would have to overload the motors but you would have saved your first cost."

Preparing for Belt Stretch

A method for maintaining correct belt tension is outlined in an article "Preparing for Belt Stretch" in the November issue of a publication of the W. J. Baird Machinery Co., Detroit. The article emphasizes the importance of making allowance both for elastic stretching and for changes in weather conditions for belt installations not provided with adjustable pulleys, adjustable shafts, or tightener pulleys. A method, that was worked out in the shops of a railroad, is outlined as follows:

"When a belt is first put on, it is cut 6 in. too short. A 6-in. filler piece is then inserted with rawhide or wire lacing. Of course the belt immediately starts to stretch but this is taken care of by taking out the small 6-in. insert and replacing it with a 5-in. insert.

"As the belt stretches still more, it is a quick, easy operation to replace the 5-in. piece by a 4-in. piece and so regulate the belt as it gradually becomes shorter. The short lengths which are inserted temporarily can of course be used over and over again, and the method has been found to increase the life of the belt materially."

Reliance Wheel Co.'s New Plant

Construction operations start this month on the new plant of the Reliance Wheel Co., Youngstown, Ohio, on a five-acre tract near the General Fireproofing Co. plant on Logan Avenue. The site is served by the New York Central and Erie railroads. The company is now operating in leased quarters which will be given up as soon as its own buildings are completed. Stockholders have elected the following directors: Lucius B. McKelvey, Charles T. Gaither, J. S. Culp, Joseph M. Crenan, Dr. S. W. Goldcamp, T. E. Milliken and Harold E. Hull. Officers were elected as follows: Joseph M. Crenan, president; T. E. Milliken, vice-president, and H. E. Hull, secretary-treasurer. The company manufactures the Reliance pressed steel double disc wheel for automobiles.

"Information Concerning Tungsten-Bearing Ores" is the title of a pamphlet printed by the United States Tariff Commission for the use of the Committee on Ways and Means of the House of Representatives. It gives data on domestic and foreign output, on imports and tariff duties as well as exports and a large amount of general information.

Drinking water, wash and locker rooms, and toilet facilities is the subject of No. 27 of Safe Practices issued by the National Safety Council, 168 North Michigan Avenue, Chicago.

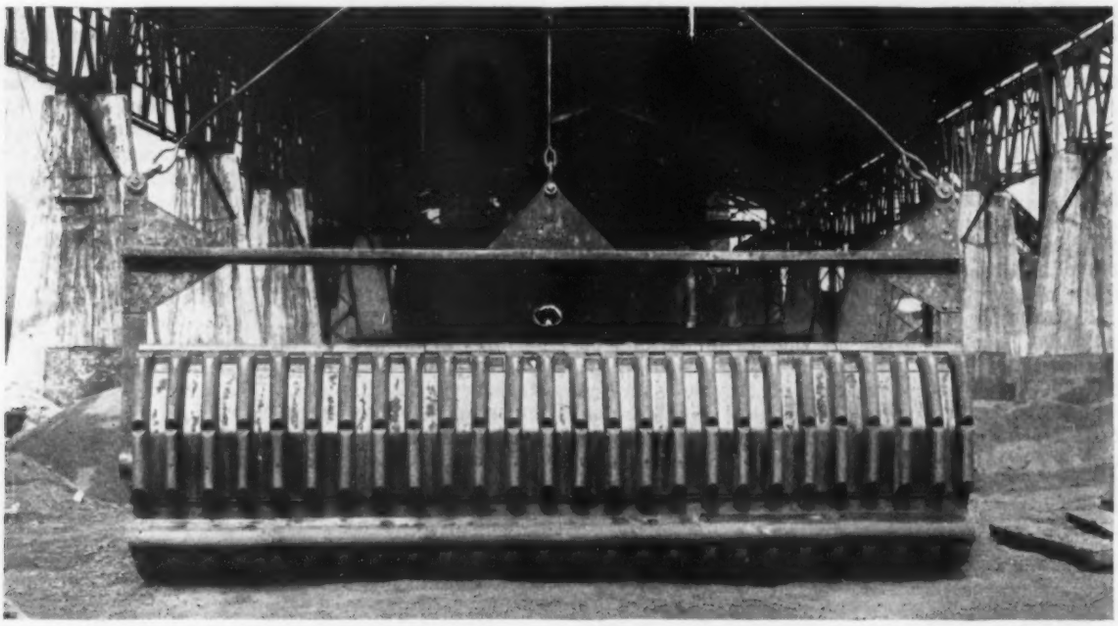
MOLDING MACHINE FOR PIG IRON

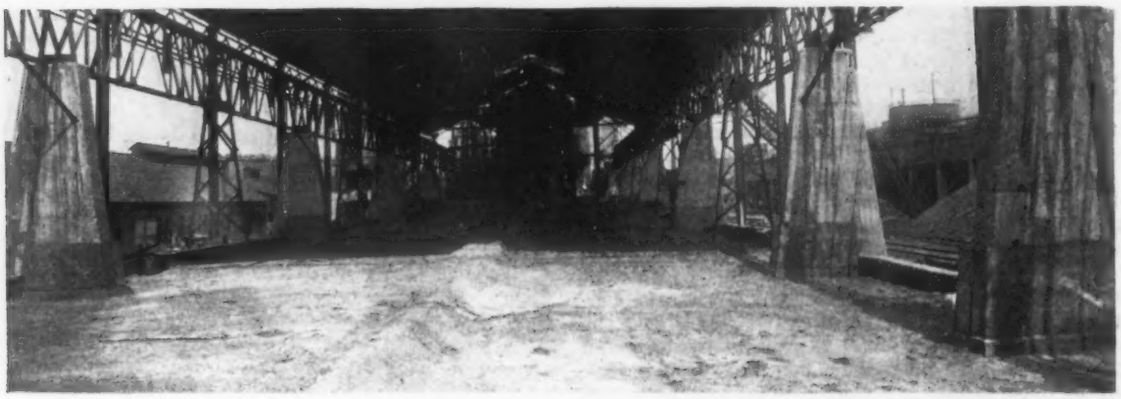
Pig Bed Prepared and Side Molded in 15-min. Period—A Minimum of Jump Cores

To cut the cost of cast-house labor and also get away from the present-day labor troubles, a molding machine has been perfected and patented by John O. Goodman and B. A. Shutts of the Central Iron & Coal Co., Holt, Ala., which, it is stated, does away with the hand molding method used at blast furnaces casting in open sand.

The machine, as shown in the accompanying illustrations, is cylindrical in shape with four offsets which allow for the proper setting of the patterns, and is mounted on a shaft to which is attached a bail by which it is drawn over the sand bed, the latter being first prepared with a drag operated in the same manner or by the same power as the molding machine. If the cast house is equipped with an overhead crane of sufficinet power, no other equipment is necessary, if no overhead crane is available a single-drum hoist engine can be used.

The machine shown is in operation at the Central Iron & Coal plant. Attention is called to the clean cores made in comparison to the hand-molding product; and it has been demonstrated that the molding is so uniform that what is known to the furnace-man as a "jump core" rarely occurs and then only when the iron is allowed to flood the bed. The time required to prepare the pig bed and mold the side, as shown in the views of the process, is exactly 15 min., a gage of possible economies of time and labor, which it affords.





A Blast Furnace Pig Bed Molding Machine Drawn by Means of a Bail Over the Sand Bed, Shown in the Other Views Before and After Setting the Patterns

Marking Shipments to Expedite Production

Full Identification of Consignments—Reducing Confusion in Manufacture and Correspondence — How to Number Containers

THE object of manufacture being to supply a need, the matter of delivering the product is of vital importance to the usefulness of the product and a condition requisite to the payment therefor. The more expeditious the delivery, the sooner the need is met, and the sooner the manufacturer receives payment for his product, an interest saving to the producer of no small consideration, with an appreciable reduction in correspondence cost to both the consumer and the producer.

Orders for Materials

The product must answer the need as expressed in the specifications set forth in the order for the materials. Hence, the order for the materials should be the basis upon which the manufacture or supply proceeds. The following method has been suggested to embody this principle.

Manufacturing work orders and assembling instructions should bear reference to the purchaser's order number and date and should state clearly which items thereon are being filled. The name of the article should be stated as it appears in the order, followed by such amplifying data as the number of units in a set, component parts, etc. Inspection instructions and any desired shipping instructions should be quoted in the original plant orders. Sufficient number of copies should be made for the use of all plant departments. Copies of the plant order should follow the process of manufacture, or through the stockrooms, and then, with the materials, successively to the assembling, inspection, shipping departments, and finally to the billing department. The product will be followed through its progress and each department will be automatically furnished with all necessary information for its part in the movements of the materials. In manufacturing plants, progress work sheets, cost sheets, etc., may be incorporated to show the status and movements of materials, if the plant system make such additional records necessary and desirable.

The product assembled for inspection should answer in every particular the specifications called for in the order. Only complete unit should be passed for shipment.

Assembling Warehouses Needed

The monetary saving to be derived from having component parts shipped from several points, or from the same point, at varying intervals has been proven doubtful and in many instances has resulted in great interest losses to the manufacturer with voluminous correspondence, and in such cases the usefulness of the product to the consumer is defeated in a degree equal to the delay in identifying and assembling the component parts. It is believed that a careful study on the part of the manufacturer or shipper will disclose the fact that his interest losses in such cases far exceed the assembling costs and additional transit charges, if any. Manufacturers or shippers making large deliveries at a given point could well afford to establish an assembling warehouse near the point of delivery.

Visualizing the Consignee's Position

The shipping department in any institution plays an important part in the efficiency of the institution. This office provides the connecting link between the consignor and the consignee. It is essential that the shipping officer entertain visually the position of the consignee, for whereas the manufacturing plant may be small, the consignee's plant may be large and handling many incoming shipments. The shipping officer having in hand the full knowledge of the contents of a shipment and the manner in which it is packed for shipment, should forward this information to the consignee. This information should go forward with a shipment, or be so forwarded as to be at the point of destination at the time of, or prior to, the arrival of the material. The containers should show the name of the consignor, the full address of the consignee, the date and number of the purchaser's order, the weight of the container and a designating number.

Manufacturers and shippers fail, as a general rule, to appreciate the advantages in fully identifying their consignments. A moment's reflection, however, will demonstrate a few of the many advantages. Firstly, the transportation company can better handle the fully described shipment. It often becomes necessary for transportation companies to transfer materials en route and unless containers are identified with the shipping papers, one or more consignments are liable to be confused and arrive at destination in a manner at variance with the invoices to cover. The transportation company will be in a position to refer definitely to a stray container and make definite records relating to damage done to any particular container in a shipment. Damaged cases or shortages found can be reported with reference to the container number damaged or in which the shortages were found.

Bills of lading showing that a consignment consists of a number of cases bearing a designated number or numbers will be held intact and delivered to destination as it left the hands of the consignee. The receiving office will be in position to check the exact designated cases against the bill of lading, memoranda of shipment and invoices. Correspondence can be conducted with exact reference to the shipment or container in question. The designated numbers given containers should be shown on all shipping papers, memoranda of shipment and invoices to insure the proper application of these papers with the materials.

Numbering the Containers

Containers may be numbered in several satisfactory ways, but any system of numbering should be such that no two containers would ever bear the same designating number. Hence, the fallacy of numbering two or more consecutive shipments beginning with "case number one," unless there be assigned in addition a serial shipment number. The consignor should not be left to guess what shipping numbers may mean. The consignor should state clearly "Case number...., shipment number...., your order number...., etc." The following methods of numbering containers are recommended:

(a) A continuing series covering a calendar or fiscal year. All containers will be numbered serially and these numbers shown on all bills of lading, truck receipts, memoranda of shipment and invoices. The additional use of a shipment serial number will also prove advantageous.

(b) A serial number for each shipment, this number, to be shown on all containers in the shipment. The serial number with the total number of cases bearing the number, will be shown on bills of lading, truck receipts, memoranda of shipment and invoices. If the containers are of uniform contents the packages should be marked, "Shipment number...., Case number....." Separate serial or shipment numbers should be assigned to each lot of material presented for shipment. Shipments under a particular order will thus be packed separately. As stated below, however, two or more shipments may, for advantage, be covered by one bill of lading. In the latter case the several shipment numbers should be shown on the bill of lading.

No exception should be made for one package shipments or for parcel post deliveries. The firm receiving

a large number of parcel post deliveries is unable to identify them unless they be given an identifying number. All outgoing materials should pass through one point, i. e., the shipping department and be assigned a release number, i. e., the serial shipment number—incidentally a check on materials leaving a plant.

Duplicate Plant Orders

Following the routine above outlined the shipping officer would receive materials ready for shipment accompanied by three copies of the original plant order, or three copies of an order covering reserves thereon. The materials would be suitably packed and the containers numbered. If the packings are of uniform contents a packing list should be placed in each container and a summary of the detailed packing appended to the memorandum of shipment. Numbers assigned would be shown on all three copies of the plant order. The method of delivery or routing, date of shipment, car numbers, etc., will be shown on the three copies of plant order. One copy of the plant order, thus completed, will be forwarded to the billing department; one copy (memorandum of shipment) will be attached to the bill of lading, the remaining copy to be retained for the files of the shipping department, so filed that the next consecutive number will be readily attainable, and, in fact, a complete record of shipments, automatically kept.

What the Bill of Lading Should Show

The bill of lading should show in addition to the carrier's requirements the serial shipment number and other designating numbers as shown on the containers. Two or more shipments may be advantageously covered by one bill of lading. The bills of lading in such cases should show the shipment serial numbers covered thereby. It is of paramount importance that the bill of lading with memorandum of shipment attached be at the point of destination at the time of, or prior to, the arrival of materials.

The billing department should quote in the invoices the item numbers appearing in the purchaser's order and so state the item as to be readily applied against the purchaser's order in units and at prices agreed upon, with a full description of the shipment, i.e., shipment number, number of containers, container numbers, car numbers, routings, etc., in order that the invoices may be properly applied. There are advantages to be had in having the invoice number and the shipment number the same. Invoices should be rendered covering each shipment and with the least possible delay.

Correspondence should bear reference to the purchaser's order number and date, and if pertaining to a particular shipment, or container, reference should be made to the shipment number, date of shipment, container number, etc.

Direct Shipment by Sub-Contractor

Materials supplied direct to the purchaser by a subcontractor makes for confusion at best. Deliveries made direct by a third party should be discouraged and only be permitted where transit costs and time of delivery are appreciably less. In such cases the sub-contractor should be furnished with full particulars of the purchaser's order and should be instructed to mark containers and papers with the initial purchaser's order number and date, and indicate that the delivery is being made for the contractor's account.

The establishment of a uniform practice will materially increase the efficiency of supplying agencies, carriers and consumers.

A notable publication on coke ovens has been issued by the Koppers Co., Pittsburgh. Some of the features of the generously illustrated pamphlet are unusual sectional drawings of oven construction that are calculated to help materially in the understanding of the Koppers design. Another notable feature is a diagram showing the steps in the recovery of by-products. The illustrations include informing views of installations in steel and gas plants and the descriptive matter covers the Koppers ovens, the by-product recovery methods, ammonia concentrating plants, the Koppers benzol recovery system, etc.

THE EXPERIMENTAL MOLDER

Removing the Causes of Defective Castings—Heading and Gating—Rust Particles

An experimental molder, whose sole duty is to investigate the proper method of gating and heading castings as they come into the shop, should be employed by every up-to-date foundry, according to Henry Traphagen, of the Toledo Steel Casting Co., Toledo, in his paper before the American Foundrymen's Association, Sept. 29, on "The Value of a Scrap Pile." He recommends that this man be paid by the day, so that he will not be hurried. The work of such a man, he points out, is facilitated by the fact that common defects in castings naturally group themselves into classes that are easily recognized. He classified these as: (1) the carelessness of the workman; (2) over-production tending to careless, sloppy work; (3) attempting to make good material out of junk; (4) use of too little fuel, too much scrap, cheap refractories and too much reliance in green-sand molding. Hot lively metals, he emphasizes, will insure a maximum of good castings; and in this connection he warns against too low a bed in the cupola, too close an adherence to a theoretical correct melting ratio which disregards the size of cupola, amount of scrap, kind of coke, percentage of steel in mixtures and size and condition of sprues. Another fundamental cause of cold iron, he states is due to the melting of off-heat pig iron, and he advises using it in the mixture only very gradually, say one pig to a charge, if it is must be employed at all.

Thin, dirty, rusty scrap, he brings forward as the cause of sluggish iron, and points out that such finely divided rust particles enter the metal and becomes emulsified, constituting an impurity which cannot be eliminated by fluxes, deoxidizers or other cleansing agents. To this impurity he attributes the tendency in sheets to quick rusting, brittleness in steel, non-ductile qualities in some drawing stock, and dirty and porous castings.

In connection with the design of molds, the special field of the experimental molder, he places the provision of ample venting as a first essential. Precautions, he states, should be taken in green-sand molding to vent the drag as well as the cope; and he warns against casting parts for hydraulic or gas apparatus in green sand on account of the porosity resulting from the steam generated in the mold. In casting with an oil-sand cover core, he advises that the commonly large percentage of defective castings may be avoided by puncturing the cover with three or four pop heads.

Many of the troubles encountered in foundry practice, he shows, are caused by the improper use of water, by too damp fuel, too moist linings in the converter, troubles which proper investigating of the defective castings in the scrap pile will disclose to the discerning eye of a skilfull experimental molder.

Special Equipment for Heat-Treating

The Quigley Furnace Specialties Co., 26 Cortlandt Street, New York, is putting on the market a complete line of carboning pots and annealing boxes for heat treating. These products are made of a special analysis steel known as Q-steel, designed for maximum resistance to oxidation, coupled with minimum cost per heat-hour of service. In addition to the low-priced steel boxes and special castings, they will also market two high-grade alloys for similar work where the operating conditions make their use more economical. The department of heat-treatment will be under the management of H. H. Harris.

The Premier Trading Co., Ahmedabad, India, has written to THE IRON AGE requesting manufacturers of tanning equipment and machinery for the manufacture of leather goods to send catalogs and other information. The Premier Trading Co. is in the market for an Indian client, who contemplates equipping a plant to handle 400 skins a day.

An Attractive Industrial Home Town

Row Type Housing of Dutch Colonial Design for Mechanics—Provisions for Privacy—Economies in Plumbing—Drainage

BY CLARENCE W. BRAZER*

THE large new marine turbine manufacturing plant of the Westinghouse Electric & Mfg. Co. is located on the Delaware River about three miles below the southern limits of Philadelphia, in Delaware county, Pa. This town has been named South Philadelphia and lies between the older towns of Lester and Essington, each of which before the war had some 300 to 400 population. This plant, which is still in its growth, was started several years before the United States entered the war. When the land was purchased, the highest ground which is within five or ten minutes walk of the plant and well served by trolleys from Philadelphia to Chester as well as by the Pennsylvania and Philadelphia & Reading railroads, was reserved for the housing of employees.

While the Westinghouse company has some 22 housing operations, this is by far the largest of them, and when completed will provide for a population of about 6500 people or approximately 2500 male employees, as in this plant, due to the heavy character of the work, females are employed in the office staff only.

A viaduct over the railroad and trolley tracks which is located at the railroad station, has direct access from the plant to the 90-acre village. From this point the land slopes gently to the north at a fall of about 30 ft. in 2000 ft., toward Long Hook and Darby Creek. From an economical viewpoint, this, therefore, predetermined the direction of fall for land drainage and sewage, separate systems being installed. The house and factory sewage discharges into Imhoff tanks and after being purified is discharged into the tidewater creek.

Town Plan of South Philadelphia. Both the community and the manufacturing areas are shown in miniature in dark plots in upper left of bird's-eye view

The slope of the land, fortunately, flowed approximately north, and all of the residential streets were plotted as near north and south as possible in order that every room in the village might have sunlight either in the morning or afternoon, as the houses are built in rows of two, four, six and eight houses to the group. The row type house is preferred in this locality, not only for its economical first cost by saving of the side wall finish, but mainly because of the ease of heating in the cold season. This type also gives greater privacy as all windows look directly to the front and rear, and not into the neighboring house.

Where side yards occur at the end of the groups, the houses are 20 ft. apart and the alternate groups are set 15 ft. and 45 ft. respectively from the street line, thus forming courts which are attractively planted. Even though windows are placed in the sides of the houses at the end of the groups; they face these courtyards either front or rear, rather than the windows of the adjoining houses. All of the lots are from 80 ft. to 100 ft. in depth, facing upon 50 ft. wide streets paved with 20-ft. macadam roadway between concrete curbs and gutters. A grass parking strip at least 8 ft. wide occurs between

*Town planning architect, 1133 Broadway, New York.

A Street Intersection with Circular Roadway for Turning Traffic and Enhancement of the Surroundings. Sunlight is admitted and privacy is increased by setting back alternate house groups

the curb and 42in. sidewalk. Within the lot lines the houses are set upon terraces formed with the excavated cellar material.

At the rear of the lot is a 12-ft. service road or alley, which is paved 8 ft. wide with concrete forming a valley in the center as a drainage gutter for surface water of all rear yards which slope toward it and do not throw the surface water upon the neighbors' property. The rear yards are fenced in with 30-in. hairpin iron fences, the posts of which extend up to form clothes poles. As the rear yards are from 30 to 50 ft. deep, opportunity is provided for private garages abutting the service road. If built in pairs with the party wall upon the side lot line, such garages of terra cotta tiles stuccoed upon the exterior, with cement floors and slate roof to match, the houses can be erected for $400, each 10 x 20 ft. in size. It is surprising how many of the workmen, as well as the foremen and members of the executive staff, have their "flivvers."

The first 200 houses which are now completed are mainly designed in the gambrel roof, Dutch colonial style with a slate roof on frame construction above the second floor beams. The gables and first story walls are of red brick. Four-room, five-room, six-room, and a few seven-room houses have been provided. In each case the end house of the group has one more room than the interior houses, as advantage has been taken of the extra light afforded by the end wall.

All of the houses are designed in pairs, double pairs, or triple pairs, so that the plumbing pipes from the bathrooms and kitchens might be kept warm by the kitchen fire in either house and the pipes from both bathrooms and the kitchens under them are run in the same trenches, placed upon the property lines, although giving each house its own direct sewerage connection into the public sewers, which in this village are placed in the rear service road just outside of the concrete paving, as the bathrooms being in the rear of the houses, 30 ft. of cast-iron pipe was saved in each house. This location of the sanitary sewers makes them accessible for necessary repairs without digging up the roadway.

Water is obtained from the Springfield Water Co., supplying this section of Delaware County. Both gas and electricity were readily available and every house is lighted with electricity, as well as the streets and service roads, electrical wires being looped along under the rear main cornices of the house, and the telephone wires under the rear pent eaves.

Pent eaves have been adopted throughout the village, not only for quaint local style, but for the same reason that the early colonial houses in this district were built with pent eaves, that is to eliminate rain water gutters and leaders—an expensive item of maintenance in a workman's village. The pent eave fills in the space between the adjoining front and rear porches, and catches the drip from the main cornice which it throws sufficiently far away from the foundations to keep the walls perfectly dry. It is a rare storm that drives the rain against the wall under these pents.

The four-room houses are 16 ft. wide, the five-room houses 18 ft. wide, and the six-room houses 20 ft. wide. Most of the houses are 28 ft. deep. Both the five-room and six-room houses have one large double bedroom and two single bedrooms. The five-room house has a combined dining-room and kitchen and has proved more popular in renting.

The houses which have already been erected were designed mainly for mechanics and foremen and before this country entered the war, were estimated to cost about $3,000 each; but due to war conditions were built by the Emergency Fleet Corporation at a considerably higher figure, necessitating higher rents than originally contemplated. The houses are, however, practically all rented.

Eventually this village will consist of approximately 1100 houses, 200 of which are in a negro section or court reached by direct access from the plant without going through the village.

Rentals, according to the original detailed report adopted by the company were figured to produce a gross income of 9 per cent, which was found sufficient to cover all carrying charges, depreciation, maintenance, insurance, collection of rents, garbage, rubbish, etc., and pay 5 per cent upon the invested capital.

About 66 per cent of the total acreage is plotted into private lots. Public streets and walks comprise 25 per cent of the gross acreage, parks and playgrounds about 6 per cent and public building sites, such as churches, schools, and Y. M. C. A., 3 per cent.

Only every other residential street is cut through and built upon at the present time, thus reserving the unused streets and lot areas fronting on both sides, in the middle of these double blocks, for playgrounds for the children, tennis courts and vegetable gardens for those who desire to work them, until such time as complete development becomes necessary. Sewage, drainage, and utility connection have been provided in the cross streets so

Architectural Types Are Varied to Avoid Monotony. The Corner Group of Four Six-Room Dwellings (Oval) Illustrates an Effective Use of Separate Porches and Entrance in Group Construction

that the development of these temporarily omitted streets may be economically made when necessary.

The frontage on the trolley line naturally was reserved for stores, banks, "movies," etc., with apartments for the shopkeepers and offices for the professional men placed in two stories above to shield the housing district and give more privacy from the noise of the plant and railroads.

These higher buildings are broken by Central Parkway, 150 ft. wide, on which are placed boarding houses of similar height, leading to the Protestant and Catholic churches on the edge of the woods. In order to best preserve this wooded section, twin and single houses were plotted for the executive force of the plant, each with its garage on a minor service road. At the far end of Central Parkway, where the noise of organized play would least disturb the villagers, are centrally located the school, Y. M. C. A., and recreation field and boathouse; the latter on filled land. The lowest corner on the east side nearest the viaduct to the plant was reserved for the laborers section and the higher land to the west for homes of mechanics and foremen.

Fighting the Closed Shop

An effort covering several months, made by the Building Trades Council in New York, representing 31 unions in the building industry, to unionize the structural steel workers to 100 per cent has threatened at times to develop into a strike and is still unsuccessful. Although the Building Trades Employers' Association, an organization of the employers, has recognized the principle of the closed shop, the Iron League Erectors' Association, composed of firms that fabricate and erect iron and steel and affiliated with the larger organization, steadfastly refuses to admit the right to enforce the closed shop.

Since Jan. 1, 1906, no agreement has existed in the iron trade in New York and peaceful relations between employer and employee have prevailed. This is practically the only trade that has enjoyed uninterrupted peace during this period. The present effort of the unions to introduce the closed shop into structural work is believed by the employers to be indirectly an effort to unionize the steel industry, starting with those who erect the fabricated product and working back to the producers. No other reason can be discovered for the effort, as the union men claim that they are satisfied with conditions and for years have willingly worked side by side with non-union workers.

The Building Trades Employers' Association bases its right to establish the closed shop in the iron trade on the following clause which has been inserted in all contracts of members since Dec. 18, 1912: "It is further mutually agreed by the parties hereto that all labor employed under this contract shall be that recognized by the Building Trades Employers' Association." Under the organization's constitution, however, the Board of Governors has no power to negotiate an agreement with the Building Trades Council. In opposing the parent organization and the unions, the Iron League Erectors' Association contends that the Iron Workers' Union, expelled from the Arbitration Board in 1905, has among its local and international officers 11 of the men convicted at Indianapolis of violence and is not a responsible and reputable organization. It also points out that wages exceed union rates, that the workers are contented and that no trouble has been experienced for the past 13 years. Members of the Iron League Erectors' Association are:

Bethlehem Fabricators, Bigelow & Nichols, Communipaw Steel Co., Donnell-Zane Co., Eidlitz & Ross, Martin Everitt, Wm. K. Fichter, C. H. Fox, C. Hafers Iron Works, Hamilton & Chambers, Harris Structural Steel Co., Hay Foundry & Iron Works, Hedden Iron Co., Hinkle Iron Co., George A. Just Co., Lehigh Structural Steel Co., Levering & Garrigues Co., F. J. Lucius, McClintic-Marshall Co., National Bridge Works, A. E. Norton, Inc., Passaic Structural Steel Co., Post & McCord, Structural Erecting Co.

Colloidal Fuel and Fire Prevention

Preliminary reports of the findings of the National Board of Fire Underwriters as to colloidal fuels and their relation to fire prevention and insurance are contained in a pamphlet issued from the office of Lindon W. Bates, 141 Broadway, New York. Attention is called to the fire hazard of ordinary fuel oils, as illustrated recently in the fire at the plant of the Standard Oil Co., Brooklyn, which burned four days. Contrasted with fuel oil is colloidal fuel, which is heavier than water and which can be protected from conflagration by storing under a water seal.

Important deposits of vanadite have been found in Arizona and other States and it is stated that the U. S. Bureau of Mines has succeeded in devising a process by which both the lead and the vanadium may be commercially recovered from these sources. The process appears to be one of fusion with caustic soda, soda ash and a sufficiency of charcoal to reduce the lead. The ultimate product in the form of vanadium pentoxide, is said to represent 85 per cent to 95 per cent extraction of the metal.

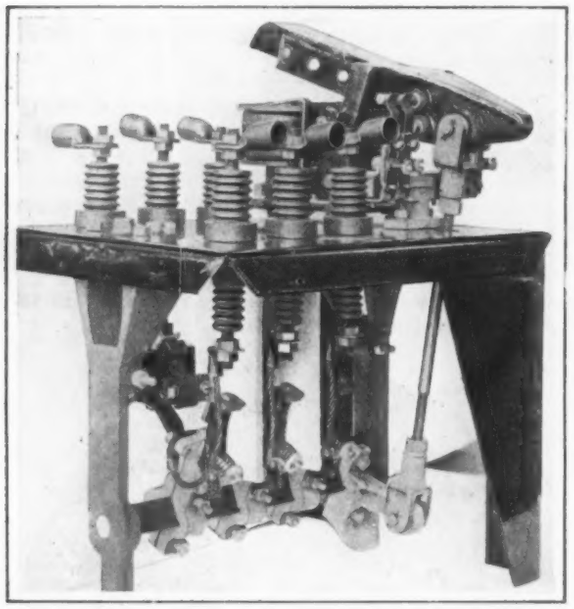
A Group of Six Brick Houses. The Dormers in Roof Provide Light and Air in Storage Attic. Along service road at rear are laid all public service pipe lines

Oil-Immersed Switch Operated by Clapper Type Magnet

Magnetically operated main line switches on alternating current light and power circuits are at times slow and unreliable in closing when a solenoid and plunger must be depended upon for their operation. If the plunger is slightly out of adjustment, its movement becomes jerky and noisy, its sealing pull is diminished, and it does not seat properly.

The Cutler-Hammer Mfg. Co., Milwaukee, has developed a new oil-immersed magnetic contactor, operated by a clapper type magnet, which is explained as making possible a more rigid mechanical structure and greater reliability in operation than is obtained in contactors of the solenoid and plunger type. This contactor has a capacity of 100 amperes at 2200 volts, and is emphasized as particularly desirable as a main line switch for an automatic 2200-volt motor starter, or for the remote control of any 2200-volt light or power circuit. It is built with three poles, unless used with an auto-transformer starter when five poles are provided.

The frame of the contactor, which is of sheet iron, is arranged for wall or switchboard mounting, and carries two cast-iron supports with two insulated shafts carrying the contacts. Copper-leaf brush contacts are saved from wear due to breaking the circuit because auxiliary arcing contacts are provided for this purpose. Leads from the contacts connect with terminals extending through high-tension insulators mounted on the top of the frame. The armature is pivoted to the frame, and is connected by a rod to an arm of the shaft carrying the moving contacts. The attraction of the armature against the face of the magnet rotates the shaft and closes the switch, which is normally held open by the weight of the moving parts.



A Rigid Mechanical Structure and Reliability Are Explained as Being Attained by the Use of Clapper Type Magnets in This Oil-Immersed Switch

A head of oil is maintained over the contacts by providing a sheet metal tank of ample capacity, and as the contacts are situated above the operating shaft they are away from any sediment which might accumulate in the bottom of the tank. The arc is broken at the contacts in a horizontal direction and therefore rises to the point of rupture without burning other parts. Transite shields prevent arcing across adjacent poles.

This new oil-immersed switch may be arranged to have two contactors act as a reversing switch, in which case they are mounted side by side, so when one switch is closed the nose on the armature interferes with the movement of the armature of the other contactor, thereby preventing the closing of the other switch, which would short-circuit the line.

INDUSTRIAL RESEARCH

A Co-operative Plan Whereby a Centralized Laboratory Serves a Number of Plants

A co-operative plan of industrial research for manufacturing establishments was discussed by Louis G. Robinson, engineer and metallurgist, Cincinnati, at a recent convention of the Mid-West Section of the American Society of Mechanical Engineers, Indianapolis. This was explained as a method whereby a large number of plants are served by one modern, thoroughly equipped, centralized laboratory. A community owned laboratory among a number of firms, Mr. Robinson said, has generally failed due to arguments arising from an equitable distribution of costs and the time spent on the various individual problems. This difficulty, he said, has been eliminated by an individually owned laboratory, operating at a cost to each client in proportion to the time spent or the work done.

Some advantages of this method of industrial research that were pointed out are: The use of trained and specialized personnel; the fact that experience gained in one plant is available in another; the absence of duplication of work, apparatus, and investment; the fact that small plants can co-operate along with large plants; the ease with which initiative and diplomacy may be applied; the small cost of operation due to a unit equipment; the utilization of specialists to their fullest value along with the general lightening of the burdens of works managers of the details of research.

The general method of conducting this form of research work, Mr. Robinson said, is first, to get a fundamental knowledge of the routine work necessary in the operation of the plant, then gradually secure a working knowledge of the processes, both physical and chemical, after which technical control of the operation should be established, and research work in the laboratory should be conducted. From the facts thus obtained, he said, it is generally possible to draw conclusions which will either improve or standardize the process, cutting out losses or variations in the product.

It was explained that during the period of technical control, the investigator becomes entirely familiar with the process and takes all the responsibility so far as characteristics of raw material and the quality of products are concerned, but he has no control over the amount of material used, the number of hours of operation or the number of men employed.

Co-operative Research in the Foundry

The application of co-operative research to foundry practice and to the manufacture of machine tools was discussed in detail. When applied to the foundry, Mr. Robinson said, it would first cover a complete study of routine work which includes analyses of iron, coke, sands, etc. Then would come the study of general conditions in the foundry, that is, a study of mixing and melting processes, core making and molding performance, and finally the pouring operation. Along with this would come a study of materials easily available and the characteristics of the finished product. Having these two steps of research work well in hand the period of technical control would be established. At this stage, it was explained, it might be necessary to make laboratory investigations along the lines of shrinkage, hardness, fluidity, etc.

Another illustration of this method of research was that applied to machine tool manufacture. The iron casting phase of this problem is handled by making very exacting specifications as to soundness of castings, analysis, strength and hardness of the iron. Important problems relate to the selection of steels, their heat treatment and carbonization, the physical properties required, the micro-structure of the steels in various conditions and the interpretation of these structures.

Other applications pointed out included bacteriological research in the investigation of the welfare of workmen and improving conditions under which workmen operate, and the mixing of durable enamels for iron or sanitary enameled ware.

Systematizing Thrift Among Employees

Automatic Savings System in Operation by Locomobile Company Proves Effective—Thrift and Labor Stabilization Result—Employees Favor the Plan

BY F. R. HICKMAN*

IN August, 1918, the Locomobile Co. of America, Bridgeport, Conn., installed for the benefit of its employees a system of savings particularly designed to meet the needs of industrial workers. The plan has been in operation for a year and a timely judgment is now possible as to its effectiveness. The system has been at work under the extreme fluctuations of industrial conditions during the past year, from war tension, through the armistice hesitation and the present peacetime readjustments. The test has been as thorough as could be crowded into any single year and, after such adequate trial, an analysis of the effectiveness of the system will perhaps prove of interest to those concerned with labor and its problems.

That the plan has proved successful may be summed up by the fact that under it the employees have saved during the year a net total of almost $200,000; per capita savings have increased decidedly; foremen and executives report noticeable effects on individuals and a feeling of stability throughout the whole plant, and perhaps most important of all, the plan has met with the marked approval of the employees.

The labor history of the Locomobile company has been "normal," probably better than average. Our men have, of course, been subject to the same influences as those in other plants in our city, our industry and in the whole country. We have had to deal with labor problems in their various degrees.

Essentially, most labor problems come down to questions of stability. If the employees are restless any little grievance will give them a pretext for going out. If relations are stable most difficulties can be satisfactorily settled. High labor turnover and strikes are merely manifestations of unstable relations; they can be reduced by stabilizing conditions.

Thrift a Fundamental of Stabilization

Fundamental, although not always apparently dominating, is the question of wages. Labor troubles may superficially take on other aspects, hours, closed shop, etc., but ultimately these, too, are reduceable to the question of pay. And it must be remembered that the wage question is not one of money so much as of what the money will buy. It is therefore a duty of the employer to help his workers make their wages go as far as possible, to help them get the most for their money.

This means that the worker should not only be discouraged from positive waste of money, but he should be encouraged to spend wisely by balancing his needs so that he shall never lack essentials. But the worker should also be able to go beyond necessities and to get for himself comforts and pleasures and so-called luxuries.

There is a natural tendency for a man to forget most things he gets for his wages, such as food, clothing, rent and similar expenditures. All he can "see he is working for" are the permanent things, such as a home and its furnishings, an education for his family, assurance for the future and, above all, his savings. The measure of his satisfaction is therefore not so much his pay as his savings.

This should prove an important factor in any efforts toward labor stabilization and the subject of thrift among employees should receive the attention from executives that it merits. Of course, no one measure is a panacea; in fact, we do not yet know of any combination of measures which is ever more than a partial cure for any of the major industrial ills, but industrial thrift does seem to be a fundamental influence in the process of stabilization.

A Thrift Bond Savings System

Some of the considerations which led to the installation of the "Thrift Bond Savings System" might be reviewed in order to define the specifications of an effective industrial thrift system and to check them against the actual methods of operation.

Many employers have realized the importance of thrift, but have taken no active steps to encourage it among their workers. It seems to be the general experience that relying upon the men themselves to save is inadequate; otherwise, of course, there would be no problem. It is essential that the savings habit be definitely, positively and actively encouraged by the employer and for this purpose ample provision for saving installed by the employer must obviously be vastly more effective than any amount of general encouragement. Existing methods of savings have proved unable to fulfill the needs of a real industrial savings method. There must be a system.

But, while the method should be provided by the employer, it is important that there be not even the slightest hint of paternalism, which has made the workers in many plants suspicious of even the most broad-minded kind of welfare work. Once the plan is installed there should be no feeling on the part of the workers that anything is being put over on them, or that any of the executives of fellow employees know of their private affairs.

The plan must be convenient. We found that difficulty and inconvenience are big counts against existing savings methods. They all required the employee to go somewhere, to do something, to think of saving every pay day and to act. An effective industrial thrift plan should be so simple and convenient as to be automatic. It should require only one resolution and action on the part of the employee, and after that saving should continue without further effort.

And perhaps the most important consideration of all is that the impulse to thrift be continuously maintained and accelerated. We saw how the Liberty Loan campaigns made millions of people in this country save who never saved before. The reason was that the idea of thrift was repeatedly "sold" to the people. The value of saving must be continuously and convincingly "sold" to the workers. Constant solicitation will not only encourage those who might hesitate but will increase the per capita savings.

These four features—a definite plant system provided, no paternalism, automatic operation and continuous solicitation—we realized must be essential in any successful savings plan. And these are the main features of the system installed at the Locomobile plants.

The System in Operation

The machinery of saving is very simple. The employee signs a subscription form, designating the amount he wishes to save each pay day from $1 up. Thereafter, in each pay envelope he finds "Thrift Receipts," which come in $1, $2 and $5 denominations, to the amount desired. When he has $10 worth of these receipts he may exchange them for a $10 "Thrift Bond." This bond is attractively and impressively engraved, and has coupons attached, which may be cashed for the interest. The employee, therefore, starts drawing interest on his money as soon as he has accumulated $10. Ten of the $10 bonds may be exchanged for a $100 bond registered in his name. Refunds are made on short notice; immediately, if the need is urgent or

*Secretary-treasurer, Locomobile Co., Bridgeport, Conn.

if the employee leaves. Thrift receipts are cashed at full face value and thrift bonds are cashed at full face value less a nominal refunding fee of 15 cents per $10 bond.

Financially, there is absolute safety. There is no depreciation of value of the thrift bonds. They represent participation in a fund of Federal, state and municipal bonds, deposited in trust with the Equitable Trust Co. of New York. They are backed by the nation-wide organization of the National Thrift Bond Corporation, New York, which was organized for the purpose by leading banking, industrial and business men.

The operation of the system requires no effort or interference from the Locomobile Co. There is no bookkeeping for us, and no cost. Headquarters of the system are at the plant and in charge of a responsible salaried agent of the National Thrift Bond Corporation. He has charge of all arrangements with the employees and an important part of his work is to encourage the men to continue and increase their savings. He speaks to them individually and at noon-hour shop talks. He discusses their personal finances as far as they are willing, giving them advice, instilling ambition and encouraging sound methods of household financing. His efforts are backed by a specially printed plant house-organ for the employees, called "The Iron Men," which deals with the subject of thrift in an inspirational, but cheerful, manner. New workers are encouraged to start saving as soon as they are employed. There is a committee on thrift of 35 foremen, who advise the employees on these matters and when a new worker is employed he is asked at the first interview how much he intends to save. In this way the new worker enters right into the thrift spirit which pervades the plant.

Results Accomplished

That the plan has proved popular, and therefore effective, is evidenced by the fact that of the 1900 employees in the two plants from 96.4 to 98 per cent are saving regularly. Average per capita savings have increased to about $2.50 per week, there being between $3600 and $4000 saved each week. Although we have some 600 fewer employees than during the war, those working are saving more than when there were more of them. The line at the service cage of the thrift bond agent numbers 300 to 500 people a week, exchanging thrift receipts for $10 thrift bonds, or the latter for $100 thrift bonds. As much as $12,000 has been exchanged in an hour. And the refunds are negligible, only about $2500 during the year. Thrift receipts and thrift bonds may be purchased in addition to those received in the pay envelope. The system was used to help employees subscribe to Liberty Bonds, and every person in the plant subscribed to the Victory Loan.

But the psychological benefits on the employees are perhaps more significant than these impressive figures. All those saving are really enthusiastic about the plan—there is no coercion, no company scheme—they feel it is their own machinery for bettering themselves. They feel that the company has provided a real convenience; a helpful device for improving personal and family living conditions.

Employees' Opinions of the Plan

Some interesting and valuable comments on the success of the plan are given in reports by some of the plant executives and foremen.

An interesting aspect is brought out by our General Works Manager, H. H. Edge. "One thing about this system," he says, "is that it is flexible. A man can save as much as he can or as little as is necessary. The plan works for the highly-paid employees as well as for the unskilled, for the men as well as women. We have 75 per cent American citizens in our plant, more than in other Bridgeport plants, but this savings plan is just as good for the foreigners as for Americans. It is easy to understand, it is safe and the bonds look fine. A man can save for anything he wants, a phonograph, sewing machine, a house or an auto. And when he starts saving he is not tying himself down to anything."

G. E. Humphries, superintendent, points out that in our plant, as in the whole automobile industry and, in fact all metal manufacturing industries, a large proportion of the workers are skilled, many highly, and that all are well paid. He says that among some of the men there is a natural easy come, easy go spirit in expenditures and they do not save as much as they ought. Their standard of living is not so high as flighty and better spending and regular saving is doing much to steady them.

Along the same lines, but perhaps more intimate, is the remark of "Jerry" Dahl, foreman of the machine room. "The boys like it. It's as easy to save as to spend—easier. They don't notice the money they save and before they know it they have ten dollars or a hundred. One of the men who is the kind who was always complaining that he didn't know where his money went now has a couple of thrift receipts in each envelope. And he seems to be having just as good a time." There's a lot in the remark that the employee who "doesn't know where his money goes" is the one who is likely to feel he isn't getting all that is coming to him.

"A man who is worrying about money or money troubles can't do as good work as one who has enough put by to carry him through hard luck," says L. J. Eaton, foreman of the screw machine room. "Married men are better workers than single ones, usually; they are steadier. But if the married ones don't know how to manage their money matters they are not so good because they worry more. This system is good for all of them. It keeps the settled fellows happy and gets the young fellows on the right road."

In the writer's personal opinion, the important feature of the system is automatic saving at the source. The men do not get a chance to spend all they earn and when they use their savings it is usually for a worthy purpose. The system is automatic and this assures continuity of operation which is beneficial to the company and to the men.

And there is no doubt that there is a steadier spirit among the employees and, while it is difficult to reduce this to production figures, it means much for the goodwill of the men, for their stability and therefore for the stability of labor conditions in the plant. We consider the system well adapted to continuing the benefits of war-time Government thrift campaigns.

Sanitary Co. of America Insures Employees

Insurance policies have been issued by the Sanitary Co. of America to the employees at its plants at Linfield, Pa., and East Greenville, Pa., who have been with the company six months and longer. The amount of each policy is worked out in proportion to the length of time of continuous service as follows:

Those in its employ continuously for six months or more, but less than one year, receive a policy for $500. Those employed one year, but less than two years, $600; and from this time up to 10 years service, the amount of the policy is increased $100 for each year until a maximum of $1,500 is reached. A number of the men have been with the company continuously for more than 10 years and therefore receive a policy for $1,500, free of cost, with free nursing service from the Metropolitan Life Insurance Co.'s district nurse. These policies terminate automatically if employees leave the company.

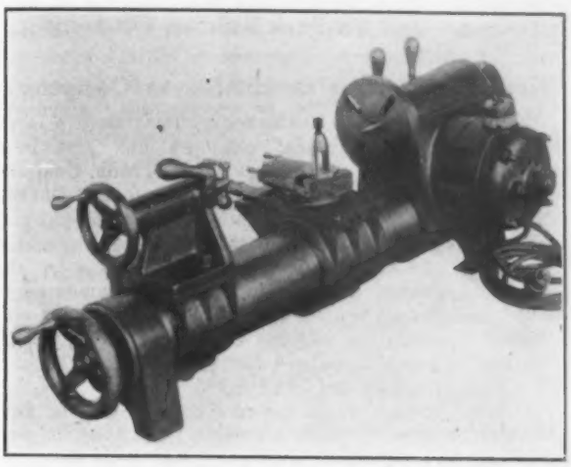
The families of the men holding policies will also receive from time to time attractive and instructive literature teaching them how to live cheaply, be well and happy, etc.

The Capitol City Iron Co., Harrisburg, Pa., will start operations, it is believed, in February. The main building, 78 x 308 ft., has been completed, and a large portion of the machinery has been received. The new concern was incorporated under Pennsylvania laws in July, with a capital stock of $60,000. Max Williams and Wolf Freedman, principals, have been engaged in the scrap iron business in Harrisburg for 25 years. A. L. Ensminger is president of the new company, and will have active charge of operations. He was formerly with the Harrisburg Pipe & Pipe Bending Co. The new plant will produce 1000 tons of bar iron monthly.

Screw Cutting Bench Lathe With Direct Motor Drive

A new direct motor-driven screw cutting bench lathe has been brought out by the Urban Machine & Tool Co., 2424 St. Clair Avenue, Cleveland. This machine is of rigid construction, all moving parts, including the motor, which is built into the head stock, being enclosed in a large housing. The gears are of alloy steel and run in oil. Radial thrust bearings are provided to eliminate end play of the spindle.

The bed is of cylindrical form, ground and provided with a hardened and ground take-up gib. A substantial tail stock embraces the bed thus to insure rigid clamping, and may be set over for turning any desired taper. The carriage internally ground, embraces the bed and has a large working surface to eliminate chatter and reduce wear. It is stated that with this mounting of the carriage an exceptionally large cut can be taken without chatter. The compound rest is rigid, provided with taper gibs and graduated and may be set at any desired angle. The longitudinal motion of the rest can be stopped instantly by throwing out the clutch lever on the head stock.



Any Standard Threads, from 8 to 64, Including 11½, Can Be Cut on This Motor Driven Bench Lathe

The machine has quick detachable change gears, and these are readily changed to any standard threads from 8 to 64, including 11½ or any desired feed. The lead screw and other important parts are protected from chips, dust and dirt. It is explained that the machine is well adapted for extremely light and accurate work, and can be used in tool rooms, experimental departments, laboratories and for general commercial work. The motor will operate from a lighting socket.

The lathe has a swing of 8 in. over the bed and a swing of 5¾ in. over the carriage. The distance between centers is 12 in., diameter of spindle nose, 1 3/16 in., hole through spindle, ½ in., diameter of tail stock spindle, 1 1/16 in., travel of tail stock spindle, 2½ in. It has a speed range of 125 to 1000 r.p.m. and a reverse speed of 300 r.p.m. It is 14 in. high, 18 in. wide, 40 in. long, and weighs approximately 200 lb.

Rauch & Lang Plant in New England

Further evidence of a come-back in the New England automobile industry is had in the announcement that Rauch & Lang, Inc., Cleveland, electric motor cars, has purchased 18 acres, immediately south and adjoining the Stevens-Duryea property in Willimansett, Mass., on which a large plant for the manufacture of pleasure cars will be built. The Rauch & Lang interests hope to start construction within the near future.

According to present plans the new plant will have a capacity of 100 cars a month, and will employ several hundred skilled toolmakers and machinists, coach builders, painters and upholsterers. The company has suffered from labor troubles at its Cleveland plant, and it was entirely due to this fact that it was decided to move east. The company has sufficient orders on its books to-day to keep the new plant operating at capacity for a year, at least.

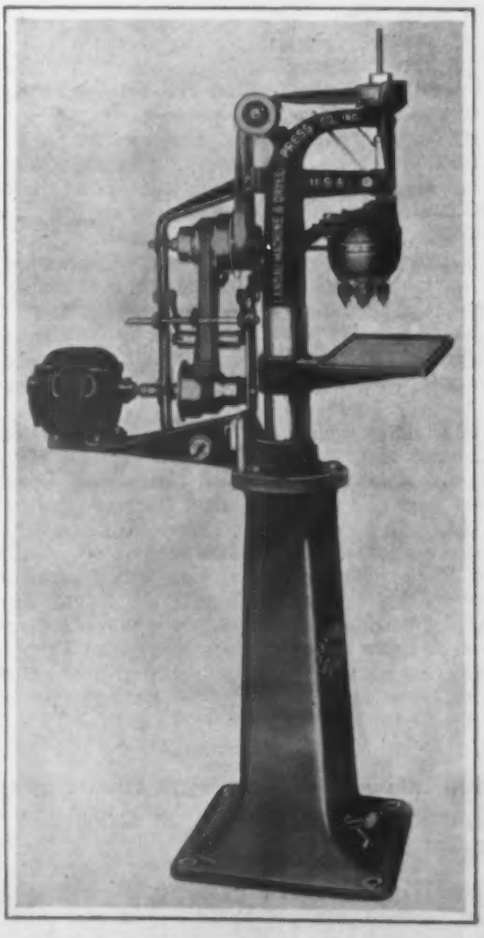
Machine for Testing Bearing Metals

Holz & Co., Inc., Pullman Building, New York, a metallurgical engineering corporation formed in June, 1919, to take over and extend the business in metal testing instruments, established by Herman A. Holz, has recently added to its standard line of hardness testing equipment a universal wear testing machine for determining the resistance of alloys to wear under various forms of friction, and varying pressures and speeds; the Holz universal metallographic outfit; and various devices for detecting internal defects in metal sections.

Combination Drilling and Tapping Machine

A drilling machine with a combination head manufactured by the Landau Machine & Drill Press Co., Inc., 19 West Forty-fourth Street, New York, has been improved by the addition of a foot pedal which is used for rotating the lower bonnet automatically. The combination head houses four separate independent spindles which can be quickly brought into service for either drilling, tapping, reaming or countersinking and without removing the work from the table.

The combination head has two component members, a stationary upper member rigidly attached to the driller standard and a rotable lower member which carries the four spindles. Each spindle has an independent means of adjustment for depth of feed, which is positive. The machine can be used as an ordinary drill press and when used in this way the remaining spindles do not interfere with the work. The drive is by a ¼-hp. motor which can be operated from a lamp socket.



A Foot Pedal Rotates the Lower Bonnet Automatically on This Drilling and Tapping Machine

COAL STORAGE FOR CLAIRTON

Carnegie Steel Co. Establishes a Yard to Insure Regular Supply to Coke Plant

The Carnegie Steel Co. is building on the Monongahela river near Wilson Station, Pittsburgh, a large coal storage yard which has for its purpose the safeguarding of operations at its Koppers by-product coke plant at Clairton against possible suspension or delays in the receipt of coal by river or rail. As a considerable portion of the steel-making activities at the Clairton, Edgar Thomson, Duquesne and Homestead plants of the company depend upon continuous operation of the Clairton coke plant, the importance of this coal storage yard is apparent.

While the storage plant is on the river, it is also along the line of the Clairton branch of the Monongahela Southern Railroad, which reaches all the steel plants above mentioned as well as the Clairton by-product coke plant. It will be possible, therefore, to utilize this yard as a means of supplying the steel plants with coal for steam and gas-making purposes in an emergency, although its main purpose is to overcome fluctuations in receipts of coal at the by-product ovens.

The facilities in general will consist of a yard inclosed by concrete walls and covered by a traveling bridge. The span of the bridge is 400 ft., with an overhang of 100 ft. at each end, one extending over the river dock and the other over the railroad tracks on the land side of the yard. The length of the bridge travel will be approximately 900 ft., so that a storage space of approximately 360,000 sq. ft. will be reached by the bridge. Additional stocking space can be secured if desired later by simply extending the concrete runway, as there is ample space available for this purpose. The bridge will carry two parallel trolley tracks operating independently and each carrying a 5-ton bucket for its entire length. A railroad yard will be constructed on the land side of the yard and a loading dock for barges on the river side.

With the above described arrangement it will be possible to place in storage coal received in barges or cars and to load from stock either rail or river equipment, also to use the bridge as a means of transferring coal directly from barges to cars. The capacity for stocking coal from either cars or barges will be about 6000 tons per day, and it can be loaded from stock at the rate of approximately 12,000 tons per day. The yard when full is estimated to hold 250,000 tons of coal.

Electric power for operation will be furnished from the Clairton by-product coke plant power house. The bridge is being built by the American Bridge Co. and the ground work is being performed by the construction force of the Clairton by-product plant. It is expected the yard will be complete and ready for operation about May 1.

The Clairton Koppers by-product plant now consists of 12 units of 64 ovens each, or a total of 768 ovens. These are all now in operation turning out about 8500 to 9000 tons of by-product blast furnace coke per day. This coke will be sufficient to serve about two-thirds of the coke consumed at the Monongahela river blast furnaces of the Carnegie Steel Co., which consists of 7 Carrie stacks, 3 Clairton stacks, 11 Edgar Thomson stacks and 6 Duquesne stacks. It is planned eventually to have 20 units or 64 Koppers by-product ovens at the Clairton plant, or a total of 1280 ovens. However, work on these additional units has not been started and may not be for some time.

Reilly-Peabody Fuel Co. Buys Orient Coke Co.

The Reilly-Peabody Fuel Co., Frick Building, Pittsburgh, has just bought the large holdings of the Orient Coke Co., which consist of 480 ovens in the Connellsville coke regions, with a capacity for making 30,000 tons of furnace coke per month. The coal lands now being developed have a coal supply that will last for 17 years, and there is also a virgin tract of coal land containing 724 acres, which will be opened by the company later. The Reilly-Peabody Fuel Co. now has the Orient works, which has 480 ovens. American No. 1 works, 142 ovens, and American No. 2 works, 240 ovens, or a total of 862 ovens, all in the heart of the Connellsville regions, and with a capacity for making close to 60,000 tons of high-grade furnace coke per month. There are also 227 dwelling houses for employees embraced in the property bought from the Orient Coke Co.

The three properties named above will be operated in the future by a new company to be known as the American Coke Corporation, with a capital of $3,000,000, of which Eugene Reilly will be president and F. E. Peabody, secretary, treasurer and general manager. The Reilly-Peabody Fuel Co. will continue its former business the same as before the American Coke Corporation was organized, and will continue to have its headquarters in the Frick Building, Pittsburgh.

New Capital for a Czecho-Slovak Company

WASHINGTON, Jan. 6.—The reorganization of a large Czecho-Slovak metallurgical company has just been completed, according to advices from Trade Commissioner Vladimir A. Gerringer at Prague to the Bureau of Foreign and Domestic Commerce. The company is the Skoda Works. The capital stock has been increased from 72,000,000 crowns to 144,000,000 crowns by the issue of 225,000 new paid-up shares of 320 crowns each; 140,000 new shares representing 44,800,000 crowns will be issued immediately and the remainder of 27,200,000 crowns of the new issue will be realized from the sale of the rest of the shares later on.

A large proportion of the new capital will be furnished by the great French munition factory of Schneider et Cie. of Le Creusot, which will get three memberships on the board of directors, the others, five in number, being Czecho-Slovaks. By interesting French capital in the reorganized company it will secure orders for the greater part of machinery, steel, and iron products needed in the devastated area of France, especially sugar factory, refinery, and general factory equipment. Necessary raw materials will be delivered from France.

Reorganization was made necessary because of the great amount of unpaid claims for munition products furnished the former Government of Austria-Hungary and consequent losses, the annual statement showing a loss of over 12,000,000 crowns for the year as against a profit of almost 21,000,000 for the previous year. The company was the largest concern of its kind in the former Austro-Hungarian Empire and its reorganization on the scale mentioned means a great deal to the new Republic of Czechoslovakia, inasmuch as the plant furnishes employment to 12,000 workmen.

While the Skoda Works has manufactured metal products of all sorts, it became noted for its cast-steel manufactures, which it shipped to Italy, Germany, Holland, Denmark, France, Russia, Japan and England.

Expansion of Bilger Steel Products Corporation

The Bilger Steel Products Corporation, with executive offices in the Rialto Building, San Francisco, which entered the Pacific Coast field Nov. 1, 1919, will maintain offices and warehouses at San Francisco, Los Angeles, Seattle and Denver for the distribution of steel and steel products, such as hot rolled bars, billets, sheets and tubes; cold drawn steel in various analyses, sizes and shapes; hot and cold rolled strip steel; cold rolled shafting and tool steel. The corporation has such Eastern connections as the Atlas Crucible Steel Co., Dunkirk, N. Y.; Standard Seamless Tube Co., Ambridge, Pa., and the Superior Steel Corporation, Carnegie, Pa.

Frank W. Bilger is president and treasurer; Anson S. Bilger, secretary; A. G. Cappel, Detroit, long identified in the tool steel industry in the Central West and the Eastern territory, is manager. W. G. Reid, assistant manager, will have charge of the export department.

The National Malleable Castings Co., Cleveland, has purchased the plant of the Missouri Malleable Iron Co., East St. Louis, and will take possession Jan. 1.

Comment on Industrial Conference Plan

Employers Generally Skeptical, But Think it May Be Step in Right Direction—Walter Drew Proposes Supreme Court to Pass Upon Labor Questions

OPINION on the report of the President's Industrial Conference, with the exception of some criticism from labor circles, has been generally skeptical. Although Samuel Gompers raises the objection that "Any plan to establish or maintain anything like fair relations between workers and employers must avoid compulsory features," and that "Any proposal for compulsory labor is repugnant to American sovereignty and citizenship," the paragraph introducing the plan submitted by the conference in no way suggests the employing of force. It says:

"The plan which follows does not propose to do away with the ultimate right to strike, to discharge, or to maintain the closed or the open shop. It is designed to bring about a frank meeting of the interested parties and cool and calm consideration of the questions involved, in association with other persons familiar with the industry."

Outlined briefly, the plan provides for the establishment of a National Industrial Tribunal in Washington, composed of nine members, chosen by the President and confirmed by the Senate. These representatives shall serve for terms of two, four and six years. Three, nominated by the Secretary of Commerce, will represent the employers; three, nominated by the Secretary of Labor, will represent the employees, and three will represent the public interest. The tribunal will be a court of appeal and in case it is unable to reach an unanimous decision, both majority and minority reports will be published. Provision is made for the division of the country into a number of industrial regions, twelve being suggested. Each of these will be allotted to a regional chairman appointed by the President and panels of employers and employees will sit on these regional boards. The employers will be classified by industries; the employees by industries and crafts. These boards will arbitrate any dispute, only upon request. They will be revised annually by the Secretaries of Labor and Commerce. Sections are devoted to public utility industries and United States employees, but with the exception of employees connected with the administration of justice and the maintenance of public safety and order, there is no suggestion that the right of organization should be denied.

The chief objection of Samuel Gompers is that the conference did not definitely recognize the organizations of workers as a basis for representation. He points out that this question should be reconsidered in order to make possible the conference and co-operation of wage earners, which can be expressed only through organizations of their own making. Mr. Gompers says: "In the opening statement, the report sets forth that the right relationship between employer and employee in large industries can be promoted by the deliberative organization of that relationship. But the report fails to give definte recognition to the application of this truth. Any plan to establish anything like fair relations between workers and employers must avoid compulsory features. The mass of America's workers are American citizens, and in the sovereign citizenship they are free men."

Mr. Drew's Plan for Supreme Industrial Court

ASKED to voice an opinion on the report, Walter Drew, counsel for the Iron League Erectors' Association and the National Erectors' Association, said:

"In the case of the proposed industrial court, when the members of the tribunal represent the respective parties, or are responsible to them even indirectly, the decisions will inevitably be a compromise and not based upon any sound fundamental principles. This was clearly demonstrated by the War Labor Board. The limited tenure of the appointees, coupled with their nomination by separate groups, puts the proposed plan of the conference upon much the same plan as the War Labor Board in this particular. It has also become apparent, not only in Canada and Australia, but in our New York harbor matter, that the Government cannot be relied upon to enforce the decisions of an industrial tribunal, even though it be a Government body.

"It follows that the decisions must rest largely, if not entirely, for enforcement upon public opinion, and this opinion, in order to be sure of itself, must in turn be an informed and enlightened one upon the fundamentals of the issues involved. Would not a supreme industrial court, with its members appointed for life by the President upon the nomination of employers and employees, meet the situation? Lower courts of like regional jurisdiction, as the present United States courts, could be created by this supreme industrial court. The members of these courts with life tenure would be removed from political fear or influence. The dignity and judicial nature of their positions would overcome any original bias or partisanship. Their decisions would be based upon sound economics and fundamental principles essential to the national welfare, and would become authoritative precedents for the guidance and development of an intelligent public opinion on industrial questions. The moral weight of a public opinion thus developed would be infinitely greater than that of public opinion at present, which usually represents the whim of the moment or preconceived ideas.

"The jurisdiction of this system of courts, except in the field of public utility service, would rest upon the voluntary submission of the parties. Any party to an industrial dispute could seek the aid of the court, which would summon the other party to respond. If the party refused, then the court could proceed in a public hearing to take testimony and to make original inquiry and to deliver its opinion in the premises. The court itself could also initiate proceedings when demanded by the public interest. With the moral dignity and authority which courts thus established would occupy in the public mind, no one could afford to disregard its summons or its decisions. Appeal from lower courts in major cases, or where the public welfare was concerned, could be provided for to the supreme court. The supreme court could also have original jurisdiction in cases of paramount importance, or where a Government department was involved. The court could be given legal jurisdiction, if desired, and its decrees made binding in cases affecting public utilities.

"Aside from the judicial feature, it seems to me that the great value of such a tribunal would be the education of the public in sound economics. There is little or no general knowledge on even the primary economic principles. The ignorance on industrial sub-

jects, even in high places, and often where the power of important decisions rests, is almost unbelievable. A court composed of the best men to be had, equal in dignity and rank to the present Supreme Court, would become a source of authoritative opinion and a great educative influence."

Mr. Drew has written the commission a letter, giving his views as stated above.

Cleveland Employers See Serious Defects

CLEVELAND, Jan. 5.—Cleveland employers, interviewed in regard to the Industrial Conference plan, are disposed to be critical in a rather unfavorable way. Some of the expressions are as follows:

A. W. Henn, president National Acme Co., Cleveland.—"I think the President's Industrial Conference in its proposed method of adjusting industrial disputes, is getting onto the right track, and is nearer to working out a practical plan than the President's first Round Table. From reading the report of the conference, I did not form a definite opinion on the technical details of the plan, but looking at its general features it seems to me as if the conference will be able to devise a workable plan for adjusting disputes between labor and capital. Personally, I am inclined to favor a plan something like that adopted in Canada where a 30-day notice is required before a strike is called, and during that period the matter under dispute is considered by an advisory commission. The 30-day period gives some of the hotheads time to cool down and strikes that might have been called are avoided."

J. D. Cox, Jr., second vice-president Cleveland Twist Drill Co.—"The Government sooner or later has got to take hold of and settle labor disputes, and the plan suggested by the Industrial Conference might work out all right, although I fear that at the start most of the decisions will be wrong and consequently hard on the employers of labor. I think the decisions will be wrong because the boards of adjustment would be inclined to decide labor disputes according to public sentiment which at present is at sea on labor problems. There appears to be nothing in the plan proposed to compel labor to abide by the decision of the adjustment boards. Every employer can be reached, but employees cannot be held. An adjustment board should have equal power to enforce its decisions against both employers and labor organizations. At present members of these organizations cannot be compelled to work if they do not want to. For the plan to be worked out properly laws must be passed making voluntary organizations such as labor organizations subject to suit and permitting the tying up of their funds as a means to enforce decisions made by adjusting boards."

Edgar E. Adams, general superintendent Cleveland Hardware Co.—"The question is whether the American working man is ready for the type of adjustment in industry proposed by the Industrial Conference. I do not believe that he is. The success of the United States is largely due to the fact that the Pilgrim Fathers started the country in a small way and I believe that a thing like this should also start in a small way. I don't think that the country should be asked to adopt such a plan all at once. The conference has worked out a plan which is all ready to set up as a standard. I am not familiar enough with the plan to express an opinion on its various details, but I doubt whether it would be practicable for all industries. My idea would be to put it up to two or three employers and let them try it out and demonstrate its success. Then let the demand come for it from others. Employers have got to be shown. I wouldn't want to sign up for it now. The working people are not prepared for it. See how long it has taken to bring them to really want an 8-hr. day. Of course, they were for an 8-hr. day from the start of the short-day movement, but merely for the overtime they would get, and not for the shorter hours. The employers also will have to be educated up to the plan. The plan proposed is too new to be adopted nation-wide in all the industries."

Charles Woodward, president Industrial Association of Cleveland.—"The move made by the Industrial Conference to provide means for the settlement of industrial disputes is a start in the right direction. Anything will be better than what we have now, which is relatively nothing. There should be a Governmental plan or Governmental supervision or direction of a plan for handling disputes between employers and labor. The success of any plan of this kind depends partly on whether the adjustment boards are given sufficient authority. Another thing of the utmost importance is the personnel of the adjustment boards or tribunals. The personnel must be such that impartial decisions based on justice are assured. If these boards are to succeed their members must have the confidence of labor, of the employers and of the public, for after all the public is a very important factor in the settlement of labor disputes. Very likely there are defects in the plan proposed, but it gives something to work on and the mistakes can be remedied as they develop."

Cincinnati Sees Some Commendable Features

CINCINNATI, Jan. 3.—The preliminary report of President Wilson's Industrial Conference, dealing with the adjustment of industrial disputes, issued recently, has not had the attention here it would have had if a more auspicious time had been selected for its publication. While most of the prominent business men of the city have read the report, none of them have had the opportunity of studying it in detail, due to the fact that they are now so busily engaged preparing their annual statements that they have not had the time to give it the close study it should have.

The representative of THE IRON AGE called on a number of the most prominent manufacturers to ascertain their opinions of the report, but found them loath to discuss it, the majority stating that as they have not had an opportunity to study it carefully they were not in a position to give their views. From a casual reading, however, they felt that there were a number of points to recommend it. The establishment of regional boards to adjust disputes was, in their opinion, a step in the right direction, their assertions being based on the premise that persons fully conversant with all the conditions existing in the localities where labor troubles develop have a far greater chance of coming to an understanding than would a board sitting, for instance, at Washington, and composed of men whose knowledge was necessarily limited to the particular section of the country in which they reside. The method of the appointment of the members of these regional boards also found favor with the gentlemen interviewed. The great weakness of the document appeared to them to be that no means were suggested for enforcing the decisions of the boards, and until something definite along these lines has been formulated, it would be useless to adopt the recommendations submitted.

The Unit Construction Co., St. Louis, builder of the housing development for the Youngstown Sheet & Tube Co., has issued a large pamphlet entitled, "Industrial Housing," by W. W. Boyd, Jr., of Herding & Boyd, architects. The pamphlet, well printed and profusely illustrated, describes the Youngstown project and advocates the erection of employees' homes on standardized lines, pointing out the reduction in expense and showing by photographs that beautiful homes are possible by this method. The booklet is divided into two sections, the second part being devoted to "Standardized Construction," and containing descriptions and illustrations of the Unit Construction Co.'s method of manufacturing the structural reinforced concrete on the ground and tables of cost and time for the operation.

The Matthew Addy Steamship & Commerce Corporation Organized

The Matthew Addy Steamship & Commerce Corporation, with an authorized capital of $10,000,000, has been formed under the laws of the State of Delaware, to build, own, and operate boats, and to engage in the business of exporting, etc. The incorporators are James A. Green, Cincinnati; Robert H. Green, Glendale, Ohio, and Richard M. Lambert, of Covington, Ky.

The company will be a subsidiary of The Matthew Addy Co. and was formed principally to take charge of this company's export business, which has grown to such an extent that it was felt expedient to form a separate company to take care of this end of the business. The company has chartered several boats from the United States Shipping Board and some may be purchased outright. The capital will be taken by the parent company, and the management will be the same. The head office of the new company will be in Cincinnati; but active business offices will be in New York.

W. O. Heffernan and J. Lyman Abbott will be actively associated with the new company. Mr. Heffernan was connected during the war with the Wheat Export Corporation, formed by the Allied governments to supervise shipping and distribution of foodstuffs, while Mr. Abbott also had very extensive business connections throughout the country.

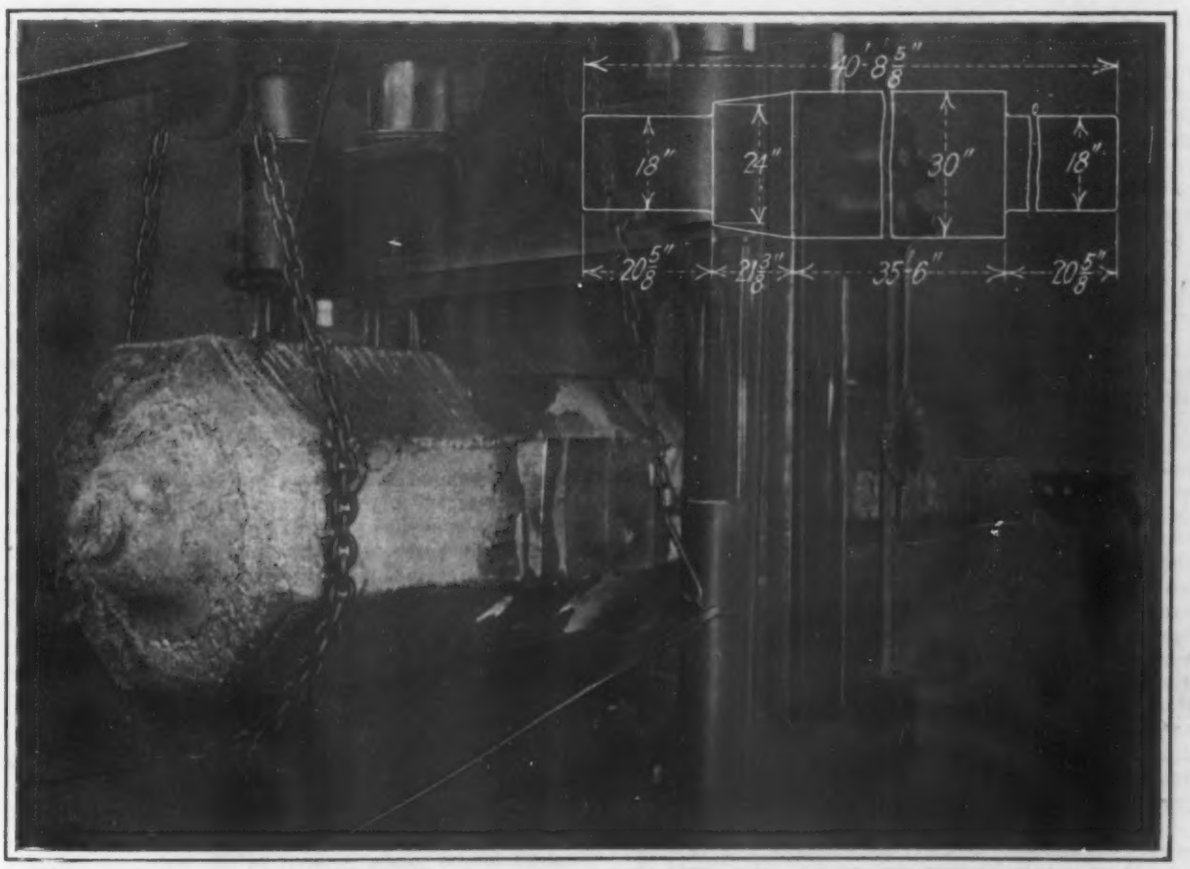
President Green of The Matthew Addy Co. is very optimistic concerning the prospects of the new company. He felt that it was a good stroke of business, now that the American flag has been restored to the seas, for American companies to make the fullest possible use of their opportunities to capture trade with other countries. As far as his company was concerned, while its export business has grown greatly during the past few years, it did not intend, now that the war is over, to sit quietly by and see this business diverted to other countries, hence the formation of the subsidiary company to handle this end exclusively. The company's ships, while naturally giving preference to their own products, will also transport commodities of other concerns.

CRUCIBLE CO. 119-TON INGOT

Cast in Mold of Same Weight to Make Ship Plate Bending Roll of 60 Tons

An octagonal ingot weighing 119 net tons and measuring 67 in. in diameter was cast and forged recently by the Crucible Steel Co. of America, the casting having been accomplished at the plant of the Pittsburgh Crucible Steel Co., Midland, Pa., and the forging at the plant at Harrison, N. J. This surpassed in weight any ingot previously made by this company by 69 tons. The procuring of a mold of sufficient size was the principal problem involved. It was furnished by the Buffalo Foundry & Machine Co. and weighed approximately as much as the ingot itself.

The ingot is being made into a roll for bending ship plates. The roll will measure 40 ft. 8⅝ in. in length and weigh approximately 60 tons, the largest roll of which the company has knowledge. The ingot was made from a 120-ton open-hearth furnace. The riser



One Hundred Nineteen Ton Ingot of the Crucible Steel Co. of America Being Forced Under a 2000-Ton Steam Hydraulic Press at the Harrison, N. J., Plant in Process of Being Made into a 60-ton Ship Plate Bending Roll. Dimensions are shown of the finished roll, which is to be the top roll of the bending mill

comprised 30 per cent of the metal cast and the top of the ingot was cropped in the usual manner. A crane of 175 tons capacity, of the company's own make, was used to handle both the ingot and the mold. It required approximately 110 hr. to heat the metal for the forging under the 2000-ton steam hydraulic press.

Inasmuch as the company's forging department is located at the Harrison plant, it was necessary to transport the ingot from Midland, Pa., to Harrison, and special flat cars were required for the purpose. The diameter of the next largest ingot made by this company was 51 in. A. E. Van Cleve, works manager of the Harrison plant, claims that the cost of making this what might be termed super ingot is higher than that for ordinary size ones because of the greater amount of risk, the large expense for the mold and the probability of losing a mold on first pouring. There was charged into the open-hearth furnace both pig iron and scrap.

The body of the finished roll is approximately 30 in. in diameter and 35 ft. 6 in. long, the necks are 18 in. in diameter and 20⅝ in. long.

Find No Panacea for Labor Difficulties

Economic and Sociological Societies and Association for Labor Legislation Wrestle with Problem of Industrial Unrest

INDUSTRIAL unrest was the principal topic of discussion in the annual conventions of the American Association for Labor Legislation, the American Sociological Society, and the American Economic Association, which were held concurrently at Hotel La Salle, Chicago, on Dec. 29 to 31, inclusive. This subject was touched upon frequently throughout the programs of the three societies, but it was brought to a focus in a joint session of the Association for Labor Legislation and the Economic Association held Tuesday afternoon, Dec. 30. This meeting was opened by an address by Dr. Royal Meeker, United States Commissioner of Labor Statistics, on "Employees' Representation in the Management of Industry." He was followed by Col. Harry B. Jordan, commanding officer of the Rock Island Arsenal, who read a paper on the works council plan in effect at Rock Island, which was described in an article published in the IRON AGE, Dec. 25. Others discussed the subject of employees' representation both from a general viewpoint and with particular reference to experiments with which they have been identified.

No Solution of Labor Problem in Sight

After surveying the existing works council schemes, Dr. Meeker asserted that neither the widely heralded English Whitley scheme nor the various plans which have been introduced in American industries constitute anything more than an initial experiment in the direction of a solution of industrial unrest. In Great Britain the Whitley system of organizing industries into national and district joint industrial councils and works committees was adopted at the instance of the Government. Up to date, national joint industrial councils have been set up in some 50 industries, besides the councils established in the Government departments for both manual and clerical employees. These national joint councils, however, are analogous to the roof of a house suspended in mid-air with no supporting side walls or foundations upon which to rest. Only three industries have set up complete "Whitley systems" of joint industrial representation of employers and employees with a national council and district councils for the industry and works committees for individual shops, and these three industries are relatively insignificant, namely, match, rubber and pottery manufacturing.

The different types of shop committees and works councils in this country, Dr. Meeker said, may be divided into three rather distinct groups, i.e., (1) closed shop committees of union workers chosen exclusively by union men affiliated with national or international unions; (2) open shop committees composed of workers chosen by the votes of all workers who have been employed in the shop a required length of time; (3) open-closed shop committees chosen by all workers qualified to vote in a shop that is closed against trade unions and which may or may not have a local plant or corporation organization of the workers. There is, in fact, little fundamental variation, he said, in the published statements of the objects sought and the plans of organization as between group and group.

Different Views of Americans and British

Dr. Meeker pointed out that respecting labor organization the position of organized employers and employees is exactly reversed in Great Britain as compared with the United States. We to-day are where the British were about 30 years ago. The question of national unions versus plant unions was fought out in Great Britain and won by the workers. British employers were obliged to accept the result and bargained collectively with the representatives of the national unions. During the war the workers rebelled against this system, insisting that wages, hours and shop conditions should be negotiated for each shop by the local shop committees. The employers stood up valiantly for the established order, and insisted that they would have nothing to do with local shop committees, but would bargain collectively only with truly responsible and representative bodies, the executives of the national trade unions. American employers, equally valiant for the established order, will have nothing to do with irresponsible, unrepresentative officials of national trade unions and insist on bargaining collectively with representatives of the workers who know the local situation and who are chosen from the shop where a dispute is pending. One of the biggest questions to be settled, in Dr. Meeker's opinion, is whether employees' representation is to be local and under the direct control and domination of the employer, or whether it is to be nation or worldwide and under the control of the workers themselves, or whether the general public will insist on being a party to every collective agreement so as to prevent the employers and employees from agreeing too agreeably and charging the bill to the ultimate consumer.

As to function, Dr. Meeker asserted most shop committees deal with grievances, working conditions (i.e., safety, sanitation and hygiene), wages and hours of labor and methods of wage payments. As to participation in management of industry in the true sense of the term, there is as yet practically none in the United States. Dr. Meeker said he was not much interested in the possibility of the workers owning, managing, and operating all industries or, at least, the more important ones. At the present moment we are not in sight of that consummation. Every worker, however, should have the right to present any grievance or any suggestion he may have regarding his working conditions to someone representing the management. The workers will not be satisfied merely to express their views. They want the assurance that their views will be given more than perfunctory consideration. If their proposals are discussed openly with them and shown to be impracticable, or inexpedient for the time, they will, in most instances, be quite ready to vote for the rejection of their own proposals.

Participation in Management Must Mean Sharing of Losses

If workers are to be admitted to actual participation, Dr. Meeker said, they must participate to some extent in the losses as well as the gains of industry. A practical method of payment would be to guarantee for each position a minimum wage which must be paid regardless of any losses which the business may suffer. In addition to the minimum, a bonus should be provided varying according to the contribution of the workers in cutting down labor costs, in reducing costs of management, in decreasing spoilage of material, in decreasing wear and tear on machines and tools, in improving quality of product, in increasing business, or in any other way. This would obviate the objection to most bonus schemes that the worker is penalized or rewarded for the inefficiency or the good judgment of the managers.

Present Labor Unrest Outgrowth of Industrial Revolution

Labor unrest, in the present-day meaning of the term, is a natural and inevitable result of the industrial revolution, machine production, absentee ownership of industrial establishments, and the centering of industrial management in the hands of managers of finance whose offices are in the big banks and office buildings of the centers of finance and trade, said Dr. Meeker. Strikes in the modern sense were practically unknown

until industrial units had grown to such a size as to erect formidable barriers between the workers on the one side and the responsible owners and managers on the other. Lack of interest in work, he said, grows out of absentee ownership. The absent industrial landlords, interested only or principally in dividends, have employed experts, scientific managers, to produce a substitute for the old-time workman's interest in his work. The theoretical ideal of maximum output with minimum expenditure of effort which can be figured out by mathematical formulae and pictured on charts, is in Dr. Meeker's opinion, never attained in practice. A much more imperfect layout, which leaves much to the ingenuity and initative of the individual workmen, in practice always achieves better results.

Unrest Reaction Against Monotony of Work

The present-day movement for industrial democracy, said Dr. Meeker, is a partial recognition of the fundamental psychological phenomenon that industrial fatigue is not simply an engineering question to be stated mathematically in foot pounds per hour or even a physiological question having to do with calories used up in the body. Work is hard primarily because it is uninteresting and monotonous or easy because it demands ingenuity or skill. Paradoxical as it seems, the way to make work easier is to make it harder by requiring more of the workmen. In so far as scientific management has resulted in merely breaking processes up into component parts, segregating so far as possible the purely muscular and mechanical operations from the creative and planning functions, so-called "efficiency" has resulted in the most disastrous inefficiency.

Calls Meeker's Ideas Unreal

Willard E. Hotchkiss of the National Wholesale Tailors' Association, Chicago, opened his remarks by stating that the usual discussions of employees' participation in management seemed to him more or less unreal. He took issue with Dr. Meeker's assertion that small plants are necessarily more democratic than large industrial institutions. He cited examples of executives who had come up from the ranks who proved more unreasonable and arbitrary than those superimposed on organizations by absentee owners. He said he was not at all sure that the great mass of labor was dominated by the same motives as the professional class, as was assumed by Dr. Meeker. He also maintained that it has not been established as a fact that the workers object to repetitive jobs. Economists, he stated, have created a complete literature on the labor problem which is based on *a priori* conclusions. Little progress, in his opinion, will be made in the direction of a solution of our industrial difficulties until principles are worked out by inductive reasoning. The problem is extremely complex and generalization is dangerous. The workers of the country, he said, are by no means equal in their attainments or uniform in their ideas. Each man has his own convictions, his own viewpoint. At this time, however, Mr. Hotchkiss said, few workmen are interested in dealing with any problems beyond the conditions under which they work. Few of them believe that they are fitted to assume any or all of the duties of the executives and financiers.

Is Works Council Scheme Dangerous Policy?

Prof. Ira B. Cross, University of California, raised the question whether the introduction of works councils did not constitute a dangerous economic policy. Often, he said, the motive for the establishment of a council is to break up trades unions. The latter, however, are really replaced by industrial unions (i.e., unions including all workers regardless of crafts). The employer takes away from the workman his trade psychology and develops instead an industrial psychology. With no national trade union to fall back upon for support, it is not unreasonable to suppose that individual plant unions in similar industries would form affiliations. Heretofore the growth of the industrial union idea in this country has been very slow. Are employers taking a wise course by encouraging it? To add force to his query, Professor Cross cited the circumstances which attended the introduction of the works council plan in a large American industry. The workmen, who were doubtful as to the advantages of the scheme, asked the advice of radical labor leaders and were told to support it on the theory that eventually it, in conjunction with similar councils in other industries, would form the basis for the establishment of a soviet form of government.

"There can be no democracy which is not based on the Golden Rule." This was the main theme of an address on "A Working Democracy," by Prof. Frank W. Blackmar, University of Kansas, president of the Sociological Society. Neither an autocracy of capital nor an autocracy of labor can be permanently successful. The same thought was developed by Prof. A. W. Small, University of Chicago, in discussing the subject, "Democracy and Labor," before the Sociological Society. He described "laborocracy" as being as objectionable as any other form of autocracy, and as inevitably doomed.

In an address on "Labor and Democracy" before the Sociological Society and on "Labor and Immigration Questions" before the Economics Association, Matthew Woll, vice-president American Federation of Labor, asserted that the bulk of organized labor is loyal to America and its institutions. "Labor," he said, "won the war. Since the armistice there have been, indeed, a few spectacular labor disputes, like the steel strike and the coal strike, but there have also been thousands of readjustments of wages and working conditions through direct negotiations between employers and organized labor without strikes, which have affected a much larger number of workmen."

Industrial unrest, its causes and remedies, was also the principal topic of discussion in a joint session of the American Association for Labor Legislation and the American Sociological Society, where addresses were delivered on the general subject of "Democracy and Industrial Life." John A. Fitch, of the *Survey*, and S. K. Ratcliffe, a well-known English journalist, is this session discussed the "mania of fear" which seems at present to be dominating American public opinion upon industrial questions. Mr. Ratcliffe stated that on his present visit to this country he was particularly impressed with the fact that "something has happened to American temper," and expressed surprise at the "amazing gusts of terror" with which America seemed to be viewing the industrial situation. In view of the splendid record of America in the war, and its very evident position of dominance in the industrial world, this phenomenon, to his mind, is doubly strange. Both Messrs. Fitch and Ratcliffe ascribed to this hysteria of fear, what they termed, attempts at coercion of labor which have been exemplified by the injunction in the coal strike and the proposed anti-strike legislation. Mr. Fitch stated that such "attempts at coercion" are the one sure way to encourage extreme radicalism. His remedy for the situation is a revival of "the old American spirit of tolerance and good will," and Mr. Ratcliffe's suggestion was a "reawakening of American social enthusiasm."

In an address before the Economic Association in its session on "Immigration and Immigration Problems," William M. Leiserson, chairman, labor adjustment board, clothing industry, Rochester, N. Y., asserted that our present labor troubles cannot be ascribed to the foreign element in our population, although in some strikes the great bulk of strikers have been aliens. In other industrial disputes, however, most of the strikers have been Americans; and native-born Americans have been as prominent in the I. W. W. movement as foreigners. According to Mr. Leiserson, anarchy will thrive where industry is unorganized, whether the bulk of the workmen are native or foreign born.

International Aspect of the Labor Problem

Another general subject which was given much attention, especially at the session of the American Association for Labor Legislation, was the prospect for international labor legislation. In an address by John B. Andrews, secretary of the association, on "America's Insularity in the International Protection of Labor,"

the labor provisions in the peace treaty and the Washington labor conferences of October and November, were discussd in detail. This Washington conference is the first held anywhere under the auspices of the League of Nations, and although America was not officially represented, Secretary of Labor Wilson served as the presiding officer. The five conventions which were agreed upon at the different Washington sessions, were discussed before the association by Americans and Canadians, who were either members of the conference itself, or its technical advisers. These five provide, with exceptions, for international regulations as follows:

1. Prohibition of child labor under 14 years of age.
2. Prohibition of night work for children under 18.
3. Prohibition of night work for women, with a period of 11 hours of continuous rest.
4. Protection for working mothers, and maternity benefits.
5. A 48-hour week as a pay basis for industrial employees.

Other Subjects Discussed by Societies

Among the other addresses which were delivered at the conventions was one by Prof. F. W. Taussig, of Harvard, former chairman, Federal Tariff Commission, on "The Effect on International Trade of Germany's Indemnity Payments." Professor Taussig holds that only through a very great increase in foreign trade can Germany meet its indemnities, and that the result of these indemnities is likely to be that eventually Germany will have the bulk of the foreign markets of the world.

In discussing the relation of wages to prices, Prof. T. H. Carver, Harvard, said, in effect, "The increase in wages has nothing to do with the increase in prices. It is equivalent to saying that the length of the shadow makes the height of the tree, to say that the increased wage makes the increased price."

The Gear Shaper Co.'s Annual Bonus

Following a custom inaugurated in 1916, the Fellows Gear Shaper Co., Springfield, Vt., on Dec. 24 distributed an annual cash bonus to its employees. Approximately 665 employees received this bonus, which amounted to a total of $25,000. The rating of this bonus is governed by the length of continuous employment, and is based on the total wages earned during the year. For the first and second years it is 2 per cent of the total wages earned, and increases by 1 per cent each succeeding calendar year up to 10 per cent.

The bonus distribution this year was of special interest to those who were in the Service during the world war. To all of these who returned to the employ of this company, the bonus was calculated from the time of their original employment. That is to say, when they returned, they were not considered as new employees, and the time spent in the service of "Uncle Sam" was not deducted.

Of the 665 employees, approximately 15 per cent received over 5 per cent bonus, which means that they had been in the employ of this company for over five years. This figure would have been larger except for the fact that within the past year the company has increased its manufacturing capacity 60 per cent, necessitating the employment of a considerably greater force. In fact, the shop force alone has increased about 50 per cent within the past eight months.

Puddlers' Wages Advanced

Puddlers' wages will be $12.63 per ton for the January-February period, based on a card rate of 2.55c., disclosed at the bimonthly examination of sales sheets of selected Middle Western bar iron mills held Dec. 24 at Youngstown, Ohio, between representatives of the Western Bar Iron Association and the Amalgamated Association of Iron, Steel & Tin Workers. The boiling rate for November-December was $12.38 per ton, on a 2.50c. card. There was an increase therefore of 0.05c. in the card, or $.25 a ton in the puddling rate. James H. Nutt represented the manufacturers and M. F. Tighe, Pittsburgh, president, represented the Amalgamated Association.

The boiling rate had been unchanged since May 1, 1919. For the May-June period last year there was a drop of 0.25c. in the card. The January-February, 1919, settlement was on a 3.10c. card.

On Dec. 23 a Christmas entertainment was held for its employees and their families by the Stowell Co., founder and manufacturer, South Milwaukee, Wis. More than 1500 persons filled the Stowell auditorium to enjoy the program that was followed by a dance. R. A. Nourse, vice-president and general manager, was called upon by the men of foundries 1 and 2 of the company to present a gold watch to their former foreman, Joseph Hassa, who has been appointed in charge of the new Pelton plant in Milwaukee. Matthew Potter, plant superintendent, was master of ceremonies.

In the World of Labor

The Graton & Knight Mfg. Co., Worcester, Mass., manufacturer of leather belting, has offered to its 2200 employees the opportunity to purchase the common stock of the corporation on an easy payment plan. The stock has a par value of $25. It is offered to the workers at $75, which is considerably below the book value but the full present market value. The basis of dividend has been set at $5 a share, which will net 6 2/3 per cent on the price paid by the employees. The announced purpose of the company is to make of its workers partners in the business, for their stock will carry with it the voting power.

As a further step in the policy of the Pittsburgh Coal Co., Pittsburgh, to encourage its employees to save money and become partners in the business, the directors of the company have authorized a special compensation payment of $1 a share of its stock. The stock may be either common or preferred, as of Dec. 1, 1919, and yearly thereafter until changed or withdrawn. The payment may be made through the Pittsburgh Coal Co. Employees' Association on all fully paid shares of the company's stock.

Proprietors of heavy foundries in Cleveland have reached an agreement with their molders for a new wage scale of 90c. an hour. Under the old contract which expired Jan. 1 the men received 75c. an hour but they demanded $1 an hour and the foundrymen offered 85c. an hour. A compromise was agreed upon. The molders in the light foundries have so far made no demands. Most of the molders in these foundries are engaged on piece work but those that are working under the hour rate will probably be given a corresponding increase.

The 1600 odd employees of the three plants of the American Screw Co., Providence, R. I., have been granted an increase in wages. They will receive pay for 54 hours' work weekly, whereas they actually will work 48 hours.

The employees of Brown & Sharpe Mfg. Co., Providence, have formed a co-operative society, with a capital of $100,000, divided into 20,000 shares having a par value of $5 each, for the purpose of organizing a co-operative store.

Effective Jan. 1, the Marietta Hollowware & Enameling Co., Marietta, Pa., advanced the wages of molders and other employees 10 per cent.

The H. W. Johns-Manville Co., New York, distributed a bonus aggregating about $1,000,000 among about 1000 employees on Jan. 1.

Following a short strike, about 1000 employees in the iron working departments of local ship building plants at Norfolk, Va., returned to work Dec. 30, under a 48 hr. week schedule, pending settlement of a demand for a 44 hr. week.

Employees at the works of the Lancaster Foundry Co., Lancaster, Pa., declared a strike, Jan. 1, to enforce demands for a 25 per cent increase in wage scale.

SHEETS VERY SCARCE

Active Demand from Automobile Companies—Coal Supply Inadequate

YOUNGSTOWN, Ohio, Jan. 6.—Mahoning Valley sheet producers have closed their books for first quarter delivery and are not taking on any additional tonnage, despite a cumulative demand. In view of the sold up condition of the market, buyers are offering to accept seconds and off-grade material, and paying for prime stock in some cases. As a consequence prices of wasters and second-grade sheets have reached new levels. Among recent inquiries in this district is one from the Ford Motor Co. for five carloads of black and galvanized in various gages; another from the Standard Oil Co. for 4000 tons of galvanized and several hundred tons of blue annealed and another for 5000 tons of blue annealed.

Sheet bars are equally as scarce as the finished material.

Inadequate coal supply is still retarding operations. The Youngstown Sheet & Tube Co. is operating in all departments, with production averaging from 65 to 75 per cent. By March 1 it is expected to complete a railway spur five and one-half miles long from the company's coal properties at Nemacolin, Pa., to connect with the main branch of the Pennsylvania. This will facilitate delivery of coal to the corporation's by-product coke ovens at East Youngstown. The Carnegie Steel Co. reports schedules near normal in all of its plants except the Thomas furnace at Niles, Ohio, which has been idle for several months. The Youngstown Sheet & Tube Co. will blow in No. 2 furnace at Hubbard, Trumbull County, its only idle stack, as soon as the fuel supply warrants.

Plans of Electric Alloy Steel Co.

Offices will be shortly established and organization effected by the Electric Alloy Steel Co., formed at Youngstown, Ohio, to manufacture vanadium steel, nickel steel, chrome nickel steel, chrome vanadium and other high grade steels used in the manufacture of automobiles, locomotives, machine tools, cutlery and the like.

Louis J. Campbell, president of the company, Jan. 1, severed his connection with the Youngstown Sheet & Tube Co., of which he had been vice-president in charge of commercial relations. He states the company was organized because of the increasing demand for high grade steels. No company in the Mahoning Valley now manufactures a steel of the quality which the Electric Alloy Steel Co. will produce.

Mr. Campbell says his company has purchased outright vanadium in sufficient tonnage to take care of its requirements for a long time, the purchase amounting to about 10 per cent of the vanadium in this country.

The company's plant, work on which will start in February, will be located in Trumbull County, between Warren and Girard. Additional holdings remain to be acquired. At the start electric power to operate the furnaces and other units will be purchased from the Republic Railway & Light Co.; later the company intends to generate its own current.

Mr. Campbell states the initial capitalization of $1,500,000 will be increased. The stock consists of 15,000 shares of a par value of $100.

The initial plant will contain one 1½ and one 6-ton electric furnace, also a 10-in. and a 16-in. bar mill and a 5-ton forging press. The company will specialize on the manufacture of vanadium, chrome and nickel steels. The exact site for the new plant has not been selected, nor have any contracts been placed for buildings or equipment. A meeting of the board of directors will be held shortly for organization, and L. J. Campbell will be elected president. While James A. Campbell and L. J. Campbell will control the majority of the stock, other Youngstown interests will be connected with the new company, and it will not be a subsidiary of the Youngstown Sheet & Tube Co. The plant will be built under the direct supervision of Barton R. Shover, consulting engineer, 424 Oliver Building, Pittsburgh. The new company expects to start placing contracts for buildings and equipment within a very short time.

PRICE RESTRICTIONS

Removal from Coke and Coal Not Yet Ordered—Statistics of Production

WASHINGTON, Jan. 6.—Although protests against the continuance of price restrictions on coke and coal are reaching Washington, no move has been made toward lifting them. Action seems to be awaiting hearings to be held starting Jan. 12 by President Wilson's coal commission, composed of Henry M. Robinson, Rembrandt Peale, and John P. White. Notices have been sent to operators and miners to be prepared with their presentation of all the facts in the wage and prices controversy for the commission at that time.

The weekly report of Walker D. Hines, Director General of Railroads, shows that coal production is again sufficient to meet current requirements.

The weekly report of the Geological Survey shows that the holiday slump carried the output of beehive coke down to 322,000 tons during the week ended Dec. 27. Compared with the preceding week, this was a decrease of 58,000 tons, or 15.3 per cent. The decrease was felt in all districts. The active state of the coke market, however, the report says, is indicated by the fact that, in spite of the holiday season and a restricted car supply, production was greater than at any time from mid-April to mid-July last.

The total production of beehive coke from the beginning of the year to Dec. 27 was 19,440,000 tons. Allowing for the working days which remain, this suggests an output of 19,650,000 tons for the year 1919. This compares with 30,481,000 tons for 1918, 33,168,000 in 1917, 35,464,000 in 1916, 27,508,000 in 1915, 23,336,000 in 1914 and 33,585,000 in 1913.

The smallest output of beehive coke for many years as shown by the 1919 figures is due, the Geological Survey reports, to the competition of by-product coke and the comparative inactivity in the steel industry in the year just closed. The production of bituminous coal during the year 1919, also, was less than for any year since 1915. The total up to Dec 27 was 451,618,000 tons. With three working days remaining, this suggests a total for the year of 458,000,000 tons. The total reached in the record year, 1918, was 579,386,000 tons. While the Christmas holiday caused a drop in the total bituminous output, the rate per working day during the week of Dec. 27 was practically the same as that for the week before. The average rate of production was 85.5 per cent of normal. On Monday, Dec. 22, the output was 103 per cent of normal. The average for the five working days was 1,724,000 tons.

Machinery Exchange at Zurich

WASHINGTON, Jan. 6.—Trade Commissioner H. Lawrence Groves reports to the Bureau of Foreign and Domestic Commerce that "certain Swiss iron and steel interests, working through 'La Société pour valeurs de fer et d'acier,' whose weekly headquarters are at Schaffhausen, have inaugurated a weekly exchange at Zurich where the buyers and sellers of machines for all purposes connected with the iron and steel industry may meet and transact business. Meetings will be held on Friday afternoon of each week at the Tonhalle in Zurich. In connection with this market, a weekly publication will be issued by the society, entitled *Feuille de Bourse Metallurgique*, which will give an account of the transactions that have taken place and other matters of interest to the trade. This paper will be edited at Schaffhausen."

Despite labor disturbances and other operating difficulties the Farrell, Pa., works of the Carnegie Steel Co. enjoyed one of its best productive years in 1919. The yearly record for open-hearth ingot output was broken by three weeks' full tonnage. In December three production records were established, monthly output of 1½-in. billets, daily pig iron production by No. 8 furnace and the monthly hot metal output by the same stack.

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The Industrial Conference Report

THE IRON AGE in this issue publishes some very interesting comments by manufacturers and others on the preliminary report of the President's Industrial Conference. Coming as it did during the holidays and after interest had been removed to a large extent on account of the failure of the preceding conference, the report did not attract as much attention as it deserved, but it is, nevertheless, a serious attempt to solve a most important problem, and the commission is showing the right spirit in asking for constructive criticism which it will carefully consider when it resumes its deliberations in a few days.

The strongest indorsement of the plan proposed by the commission is found in the objection made by Mr. Gompers, who complains because the whole structure for the settlement of industrial disputes is not based upon labor unions. The new commission wisely avoided the rock upon which the first conference split, knowing as it did that Mr. Gompers would be satisfied with nothing short of dictation by the American Federation of Labor. It has aimed to adjust disputes in a way that would be satisfactory to union and non-union men alike. Naturally there are many suggestions for changes and some of them are clearly pointed out in the interviews published elsewhere.

The plan proposed by Mr. Drew, long counsel for the National Erectors' Association and intimately connected with labor controversies, aims to put the adjustment of labor controversies upon the highest possible plane, as high as that of the Supreme Court of the United States. He proposes that the judges of the Supreme Industrial Court shall be appointed by the President of the United States upon the nomination of employers and employees to serve for life. These judges who would sit upon cases involving issues of the greatest importance to the property rights and the liberties of the people, would be entirely removed from partisan or political influences and could be depended upon, as the justices of the Supreme Court are, to act with courage and independence, and also, as Mr. Drew puts it, there would be an educational value of much importance in the proceedings of the new court. Mr. Drew's plan like that of the conference would necessarily require much time and thought to develop the details.

Manufacturers interviewed show a reasonable attitude and there is ground for the hope that with their co-operation objections to the tentative plan can be removed and important steps toward industrial peace taken.

Wages and Living Costs

The national labor conference which convened at Washington December 13 declared strongly against the principle of wages being fixed according to the cost of living, asserting: "This idea is pernicious and intolerable." Reasons were assigned that it meant fixing a standard of living and "putting progress in chains and fetters." Perhaps another reason, unexpressed, was that the delegates expected the cost of living to come down. They did urge "the deflation of currency," thus lending color to such a surmise.

Adjustment of wages by reference to the cost of living has been practised chiefly in connection with advances made to meet complaints of workers. Apparently the workers judge that they have received about everything along that line that they could expect. The memory is fresh of numerous demands made by labor in the past three or four years, that it was entitled to advances because the cost of living had increased. The Washington declaration may be accepted as admission that everything possible under the application of the principle has now been gained.

It is not labor alone that objects to wage regulation according to the cost of living. Many employers hold the same attitude, feeling that a principle is not a good one to adopt unless it can be made general in its application. No machinery exists to make manufacturers sure of selling prices commensurate with their cost of living, or in other words their production cost. Manufacturers must take their chances as in the past.

It is quite plain that it would be hazardous in the extreme to have in operation everywhere a system of governing wage rates precisely by the cost of living. Higher wages mean higher living cost, and higher living cost would mean higher

wages, whereby if there were an upward trend that trend would be perpetuated, and a downward trend likewise. As this could not occur, something would break, and neither employer nor employee wants anything to break.

Regulating wages by living cost, therefore, can be regarded only as an expedient, useful in certain applications, or to a certain extent. It cannot be universal. In the commodity markets a corresponding procedure is common. A producer contracts with a consumer to supply a stated quantity of material for a period of time, for six months, a year or several years, on the basis that the invoice price month by month shall be the average prevailing market price during the month. Quotations printed in THE IRON AGE are used as the reference in settlements under many such contracts. The system has worked quite well in the great majority of cases where employed, but if the total volume of any commodity made and consumed were bought and sold under such contracts, where would THE IRON AGE secure its "market quotations"? There would be none.

In the light of this comparison it becomes clearer why organized labor assembled at Washington decried the fixing of its wage rates in accordance with the cost of living. It wants more, and whence can it get more? The explanation is that organized labor represents only about 10 per cent of the people who work, excluding those workers who are employers, clergymen and public servants. In round figures the numbers, as closely as can be estimated, are 4,500,000 for organized labor and about 45,000,000 for all who work, outside of the classes just named. The cost of living is affected by the wages or salaries received by all the workers, while the delegates at the Washington conference were thinking of the interests of 10 per cent of the number.

The World's Need of Steel

Much that has been said in yearly reviews of the activities in iron and steel in the United States applies also to conditions in the other steel producing nations, differences being only in degree. In all cases demand is urgent and unsatisfied, largely because at no time in the past year has it been possible to approach full producing capacity. Prices are naturally buoyant everywhere. They have been held in some restraint in Great Britain, but more so here, while in Germany they have finally passed almost out of control.

War's destruction and that of the German in Belgium and France have placed these countries more in the position of consumers than producers and their prices have not been generally of international import. Scarcity of labor, especially in the United States and the slow return of workers to normal attitude in the matter of a fair day's work promise to sustain market prices for some time to come. Little in the way of abandonment of enterprise because of delays or high prices is yet apparent either in domestic or foreign trade, but somewhere the point will be reached beyond which advances in the steel market will bring a check. The consideration of prices has scarcely entered into export trade, demand being so largely made up of needs which must be satisfied, in spite of high prices and in spite of the great decline in foreign currencies.

So far Great Britain has made but slow progress in regaining her export trade in iron and steel. How far increased export demand for her steel would absorb a material increase in the output of British works is problematical. Her handicap in the matter of exchange in dealing with continental Europe is as real as that of the United States, though less in degree. The situation may be accented, moreover, when Germany can get enough raw materials to launch out on export trade in steel. The decline in exports from the United States now under way has not been greatly due thus far to the exchange situation, but that will inevitably become a factor.

The possibility of reaction from high level prices is not to be ignored. When there is a slowing down in the necessitous foreign buying that has not regarded price, the supply of steel at home may be such as to cause more consideration to be given to the question of price by domestic buyers. Sooner or later heed will be given to the possibility of the pendulum swinging the other way.

Japan and the Copper Market

One of the surprises of the year just past was the rôle played by the Japanese in the American copper market. On every recession in values, buying for Japan has been an important factor, and comment as to the object behind it has been general.

The magnitude of this unusual movement will be appreciated when it is said that in September, 1919, the copper exports to Japan of 25,028,735 lb. were nearly sixty times what they were in the 10½ years ended with December 31, 1918. In that period these exports were only 445,450 lb. For the ten months ended with October, 1919, Japan is credited with 63,100,000 lb., or over 140 times as much as in the 10½ years referred to. This buying movement did not appear until May, 1919, but since that time the exports have increased from 1,100,000 lb. in May to over 25,000,000 lb. in September. In October they fell to 9,100,000 lb.

Japanese buying of zinc, while not so striking as that of copper, has been heavy. To November 1, 1919, zinc exports to Japan were 29,650,500 lb., which exceeds by a large margin any previous movement.

The common comment in American trade circles has been that this Japanese buying is at least mysterious. In other years Japan has exported about half of her copper output. It is surprising, therefore, that that country should have made a complete reversal of policy from exporter to importer. A partial explanation is that Japan's production of copper has decreased and her consumption increased. It is evident that the war has fairly revolutionized Japanese industry. Manufacturers and workmen there have learned how to produce in mass and the country has undoubtedly started on an era of great indus-

trial expansion. One view of the situation is that because Japan had a thorough training in munition work the new expansion is strikingly exhibited in brass making. Japanese merchants appear to appreciate that Germany prior to the war had an extensive export trade in manufactured brass products to the Far East and to South America. The effort to capture this may be one explanation of Japan's recent buying of copper.

Whether or not this heavy demand for metals and other materials points to the development of a "Germany of the Far East," as has been freely indicated in some quarters, it is certain that Japan with her cheap labor and great imitative power will soon be or already is a competitive factor of new importance in the world's trade.

Great Britain's export trade in iron and steel continues to lag. One year after the armistice her shipments to foreign consumers were only half as large as in 1913. Data elsewhere in this issue show that the November, 1919, exports were only 204,200 gross tons, as compared with 430,100 tons in November, 1913. While rails, galvanized sheets and black plates, wire and steel plates show a marked increase for the first eleven months of 1919 as compared with 1918, they were much less, except in the case of steel plates, than they were to Dec. 1, 1913. Rail exports were only one-fourth and galvanized sheets only one-fifth of the 1913 rate. In steel plates however, the foreign demand has been double that of 1913, corresponding to the present remarkable exports of steel plates from the United States as referred to in THE IRON AGE, Dec. 18, 1919. Steel bars have regained their pre-war or 1913 status but in tin plates the movement has been only half what it was in 1913. It is noteworthy that in black sheets nearly twice the quantity had been sent abroad to Dec. 1, 1919, that was shipped in the same period in 1913. It appears likely that present economic conditions in England and the decline in iron and steel output will interfere for a long time with Great Britain's resumption of her place in international trade in steel.

Massillon Iron & Steel Co. Sold

At a meeting of the directors of the Massillon Iron & Steel Co., Massillon, Ohio, Jan. 2, the plant and other assets of that company were sold to I. M. Taggert and Fred H. Snyder, two of the directors, who individually acted as agents for the ultimate purchaser, whose name has not yet been announced. The purchase price was $325,000. The company operated a pipe foundry which has been shut down since 1917. The company's assets are given at $911,000 and its liabilities at $1,482,000. It is stated that after other claims are paid the holders of $225,000 of first preferred stock will receive about 25 per cent of their investment, leaving nothing for the second preferred and common stockholders. The company in 1910 issued $265,000 in second preferred stock, a large share of this going to pig iron concerns that were creditors and which took this stock in liquidation of their claims. It is understood that the plant will be converted to other than foundry uses.

The Charcoal Iron Co. of America has resumed the operation of its blast furnace and charcoal producing plant at Ashland, Wis., which has been idle since July 1.

"THE METRIC FALLACY"

Manufacturers Have a Vital Interest in Counteracting Recent Propaganda

Do the manufacturers of the United States appreciate the activities of the propagandists who have set out to have Congress pass a law making the use of the metric system of weights and measures compulsory in this country and prohibiting the use of the English weights and measures that are rooted in the very life of the people? We are quite sure that relatively few business men know how much has been done in the past six months to create the unwarranted impression that there is a widespread demand for the adoption of metric weights and measures in the United States. Those who have taken up the metric system as a fad appear to believe that by redoubling their efforts at a time when the country is absorbed in settling the weighty questions the war forced to the front, they will be able to carry their point. The danger is that many hundreds of busy men, who know that a bill fastening the metric system on American industry would do great hurt if made a law, will not stir themselves to oppose it because they underestimate the forces behind it.

We commend to the consideration of readers of THE IRON AGE the excellent work done by the American Institute of Weights and Measures in setting out in their true light the proposals of the metric advocates and in marshaling facts concerning the use of the metric system that controvert so many of the claims commonly made for it.

The latest service of that organization is the publication of a rewritten edition of the book "The Metric Fallacy" of which Frederick A. Halsey is the author. Mr. Halsey has been an indefatigable student of the weights and measures problem and no man of all who have taken part in the metric discussion has shown anything like his grasp of the subject. What Mr. Halsey has put into this book is in short the case of the practical men of the country, manufacturers, engineers, workers—the men who carry on industry and are largely responsible for extending the trade in American machinery and other products involving measurements—as against the case for the metric system as it is put by men of the propagandist type on grounds of sentiment and on intangible claims of benefit.

As an example of the method followed in Mr. Halsey's book the chapter on "The Metric System in Latin-America" may be taken. Since South and Central America have been claimed as countries using the metric system, a questionnaire was sent out, of which 500 copies were distributed throughout South and Central America and the West Indies. The printed blanks were sent to their branches and correspondents by the National City Bank, the United Fruit Co., W. R. Grace & Co., and the Hill Publishing Co. While the claim had been made that in 12 out of 20 Latin-American countries the metric system is "obligatory," investigation showed that in but one of the countries (Uruguay) can the metric system be said to be adopted for domestic trade. It was found that in five countries English units are used far more than the metric. It was developed that the weights and measures of Latin-America are in a state of chaos for which a remedy is sorely needed.

An interesting chapter is one prepared by Samuel S. Dale, and originally published in *Textiles*, Boston, dealing with the World Trade Club of San Francisco and its pro-metric propaganda. Business houses throughout the country have been flooded in the past seven or eight months with pro-metric circulars put out under the name of the World Trade Club, with headquarters at San Francisco. Mr. Dale's investigation showed that a wealthy business man has financed the propaganda work of the so-called World Trade Club, having decided to devote a portion of his considerable fortune to the movement to make the metric system compulsory in the United States. A San Francisco correspondent, who investigated the San Francisco seat of the propaganda, writes that "the World Trade Club

is not in any sense an organization such as the name implies, it being merely a name adopted for the purpose of lending weight to the propaganda such as it would not carry over the name of an individual." The name of the "angel" of the latest metric movement does not appear on any of the vast quantity of literature which has been mailed as from the World Trade Club.

It puts in a very different light this flood of literature with which business men all over the country have become familiar, when it is made known that back of it all is the will of one man to indulge the fancy he has conceived of being instrumental in persuading Congress to make the use of metric weights and measures compulsory in the United States. It is quite certain, however, that when the House Committee on Coinage, Weights and Measures appraises the sentiment that has been manufactured in the carrying out of the San Francisco fad it will not fail to take into account the methods used in setting it in motion. Mr. Dale in summing up his investigation says:

> The regulation of weights and measures is one of the most difficult problems of government. A mistake in the control of fundamental standards is almost certain to prove irreparable. Any proposal, therefore, to change an established system calls for a thorough knowledge of the facts, clear thinking, calm deliberation and complete freedom from the influences born of bias developed by propaganda.
>
> Let there be an end once and for all to the artificial pressure that has been brought to bear on Congress to enact compulsory metric legislation, a pressure that for nearly twenty years has had its source in the Bureau of Standards and which for six months has been intensified by the mail campaign of the mysterious World Trade Club of San Francisco.

What is brought out clearly in "The Metric Fallacy" is that making the metric system compulsory in the United States would be equivalent to making a fearful jumble of our weights and measures. In countries called metric old systems are still in use and to an extent that utterly refutes the argument of uniformity on which so much stress has been put by the metric faddists. The question before the manufacturers of the country is, therefore, not whether they are to exchange the present system for another, but whether they are willing to have all business in the United States plunged into the chaos which would be the inevitable result of the legislation proposed.

Our Annual Review Number

OUR Annual Review Number of Jan. 1, 1920, had so many features of permanent value that mention of some of them is rather by way of calling attention to the whole issue than of holding the few up as exceptional.

The two-page article by our special correspondent in Berlin prompts the remark that THE IRON AGE has been the sole source of authentic information to readers in the United States on what has happened in iron and steel in Germany in recent months. There was nothing more epochal in all European industry than the effect of Germany's defeat upon her position in the iron trade of the world. Much was written on the German destruction of Belgium and French iron and steel works and on the new start in iron and steel making in these countries; but the German steel situation has been a closed book, apart from the illuminating letters of THE IRON AGE'S special correspondent.

It is to be said here also that THE IRON AGE'S weekly London cables have been the dependence of the American iron trade for developments in the European steel industry since Armistice day.

Notable articles in the Jan. 1 issue that will be kept and referred to, being so much more than stories that are built around pictures, are those on the "Infant Steel Industry of Australia," the "Design of Open Hearth Furnaces," "Status of the Powdered Fuel Problem," "Proposed Duplex Process for Making Steel," and "Charts for Testing Steel and Steel Wire."

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The Worth Brothers Steel Co., Wilmington, Del., has increased its capital from $2,500,000 to $5,000,000. The Worth Brothers Corporation, an affiliated organization, has made a similar increase in capitalization from $2,500,000 to $5,000,000.

The Gulf States Steel Co., Birmingham, Ala., is planning for the installation of new electrical equipment at its plant at Gadsden, Ala., increasing the present power capacity from 3000 to 7000 kilowatts.

The Anniston Steel Co., Anniston, Ala., has increased its capital to $1,000,000, and has arranged to take over the plant and property of an allied organization, the Southern Munitions, Inc. It also is reported planning extensions for increased output.

DECEMBER PIG IRON

A 10 Per Cent Increase Over November

A Gain of 11 Furnaces—Less Ferroalloys—Production in 1919 About 20 Per Cent Less Than in 1918

December pig-iron output amounted to 2,633,268 gross tons, or 84,944 tons a day, as compared with 2,392,350 tons or 79,745 tons daily in December and 3,433,617 tons or 110,762 tons daily in December, 1918. Active furnaces Jan. 1 totaled 262 with an estimated capacity of 87,945 tons a day as compared with 251 furnaces in blast Dec. 1, with an estimated daily production of 84,550 tons. The largest gains were made in western Pennsylvania, the Wheeling district, the Mahoning Valley, the Chicago district and Alabama. In all 22 furnaces were blown in in December and 11 were blown out. The production of ferroalloys amounted to 15,718 gross tons.

The pig iron produced in 1919 reached a total of 30,582,878 gross tons as compared to 38,506,249 tons in the year 1918.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for December and the three months preceding:

Pig Iron Production by Districts—Gross Tons

	Dec. (31 days)	Nov. (30 days)	Oct. (31 days)	Year, 1919 (365 days)
New York	134,609	130,335	95,897	1,895,516
New Jersey	3,732	5,000	5,340	1,226,303
Lehigh Valley	81,347	100,402	91,593	989,861
Schuylkill Valley	80,901	69,876	67,368	776,637
Lower Susquehanna and Lebanon Valleys	36,667	50,540	40,719	508,174
Pittsburgh district	653,273	646,122	579,439	7,019,639
Shenango Valley	146,822	147,795	132,595	1,565,006
Western Pennsylvania	144,432	83,867	66,928	1,413,882
Maryland, Virginia and Kentucky	66,662	65,101	59,943	686,558
Wheeling district	57,325	16,801	8,675	939,815
Mahoning Valley	277,450	173,334	37,805	2,983,126
Central and Northern Ohio	206,020	195,107	154,102	2,732,394
Southern Ohio	64,124	62,526	68,094	710,357
Chicago district	385,399	376,378	172,431	4,848,258
Mich., Minn., Mo., Wis., Colo. and Wash.	77,164	64,730	56,547	1,101,534
Alabama	202,105	187,833	213,298	2,109,546
Tennessee	15,236	16,603	12,784	184,354
Total	2,633,268	2,392,350	1,863,558	30,582,878

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from December, 1918, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
December, 1918	81,445	29,317	110,762
January, 1919	78,388	28,137	106,525
February	78,910	26,096	105,006
March	73,468	26,217	99,685
April	61,289	21,318	82,607
May	51,187	16,815	68,002
June	51,865	18,630	70,495
July	61,503	16,837	78,340
August	68,018	20,478	88,496
September	60,954	21,978	82,932
October	41,796	18,319	60,115
November	57,589	22,156	79,745
December	61,815	23,129	84,944

The figures for daily average production, beginning with January, 1913, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1913—Gross Tons

	1913	1914	1915	1916	1917	1918	1919
Jan.	90,172	60,808	51,659	102,746	101,643	77,799	106,525
Feb.	92,369	67,453	59,813	106,456	94,473	82,835	105,006
Mar.	89,147	75,738	66,575	107,667	104,882	103,648	99,685
Apr.	91,759	75,665	70,550	107,592	111,165	109,607	82,607
May	91,039	67,506	73,015	108,422	110,238	111,175	68,002
June	87,619	63,916	79,361	107,053	109,002	110,793	70,495
July	82,601	63,150	82,691	104,017	107,820	110,354	78,340
Aug.	82,057	64,363	89,666	103,346	104,772	109,341	88,496
Sept.	83,531	62,753	95,085	106,745	104,465	113,942	82,932
Oct.	82,133	57,361	100,822	113,189	106,550	112,482	60,115
Nov.	74,453	50,611	101,244	110,394	106,859	111,802	79,745
Dec.	63,987	48,896	103,333	102,537	92,997	110,762	84,944

The furnaces blown in are Temple in the Schuylkill Valley; one Shenango in the Shenango Valley; Adrian and one Johnstown in western Pennsylvania; one Virginia Iron, Coal & Coke stack in Virginia; No. 1 Riverside in the Wheeling district; one Haselton, Mary and Hubbard in Mahoning Valley; Nos. 1 and 2 River in Ohio; No. 3 Joliet, Nos. 9 and 10 South Chicago, Miami, and Nos. 5 and 8 Gary in the Chicago district; one Gadsden and No. 2 Hattie Ensley in Alabama; Johnson City and Standard in Tennessee.

The furnaces blown out include No. 5 Lackawanna in the Buffalo district; Oxford in New Jersey, one Aliquippa in the Pittsburgh district; Claire and Sharon in the Shenango Valley; Pulaski in Virginia; one Central and United in northern Ohio, and Nos. 1 and 2 Bessemer in Alabama.

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steelmaking iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Total production			Spiegeleisen and ferromanganese		
	1917	1918	1919	1917	1918	1919
Jan.	2,244,203	1,756,208	2,430,022	38,792	30,695	32,787
Feb.	1,829,846	1,620,254	2,209,470	32,137	26,114	28,105
Mar.	2,285,430	2,349,419	2,277,507	36,563	39,122	26,644
Apr.	2,270,937	2,411,488	1,838,677	39,595	35,511	17,308
May	2,404,380	2,513,577	1,586,805	37,701	54,633	14,604
June	2,304,155	2,407,166	1,655,944	30,829	44,844	14,254
July	2,369,630	2,456,693	1,906,604	43,884	51,762	14,805
Aug.	2,214,513	2,509,357	2,108,566	39,492	54,009	17,419
Sept.	2,198,705	2,507,381	1,828,613	42,235	66,275	20,631
Oct.	2,376,589	2,594,277	1,295,690	48,691	70,379	20,238
Nov.	2,349,545	2,501,867	1,727,656	34,688	59,638	19,964
Dec.	2,094,659	2,524,794	1,916,249	29,902	49,435	15,718

Capacities in Blast Jan. 1

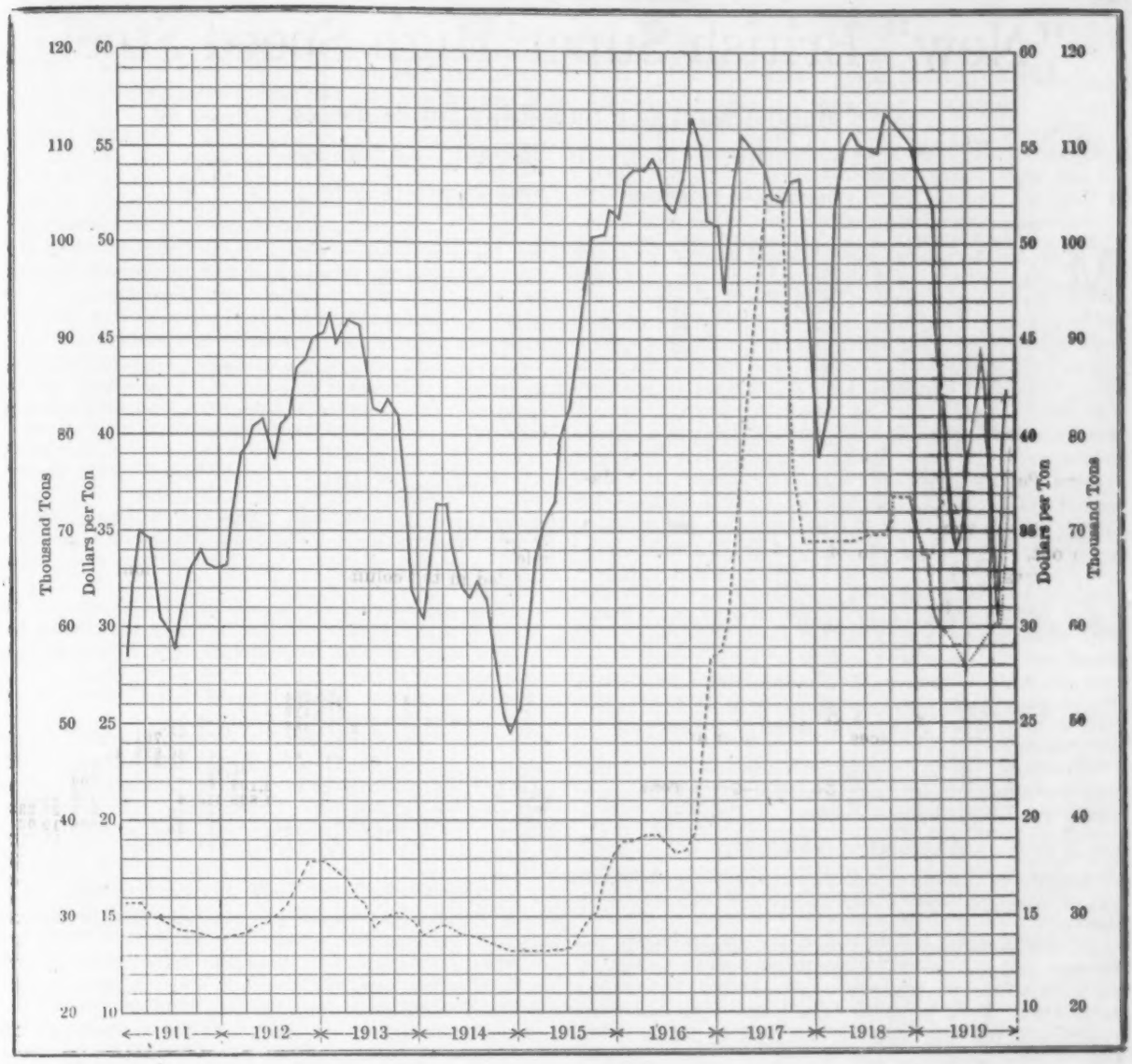
The following table shows the number of furnaces in blast Jan. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Dec. 1:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Jan. 1: Number in blast	Jan. 1: Capacity per day	Dec. 1: Number in blast	Dec. 1: Capacity per day
New York:					
Buffalo	22	12	4,040	13	3,654
Other New York	4	3	680	3	680
New Jersey	5	0	0	1	170
Pennsylvania:					
Lehigh Valley	18	13	2,480	13	3,230
Spiegel	2	1	150	1	150
Schuylkill Val.	15	10	2,640	9	2,350
Lower Susquehanna	9	3	690	3	1,020
Ferro	1	1	75	1	75
Lebanon Valley	10	3	420	3	590
Pittsburgh Dist.	53	47	20,860	48	20,990
Ferro and Spiegel	5	2	215	2	315
Shenango Val.	19	14	4,855	15	5,100
Western Pennsylvania	27	16	4,615	14	4,045
Ferro	1	1	60	1	50
Maryland	4	4	945	4	1,200
Wheeling District	15	5	1,945	4	1,050
Ohio:					
Mahoning Val.	27	22	9,400	19	6,945
Central and Northern	26	16	6,710	16	6,785
Southern	17	12	2,220	12	3,170
Illinois and Ind.	39	29	14,075	24	12,725
Ferro	1	1	75	0	0
Mich., Wis. and Minn	13	8	2,500	8	2,250
Colo., Mo. and Wash.	8	0	0	0	0
The South:					
Virginia	17	6	580	6	765
Kentucky	7	4	725	4	705
Alabama	45	22	6,450	22	6,055
Tennessee	17	7	540	5	470
Total	428	262	87,945	251	84,550

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1910 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnace



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

at Chicago, and No. 2 X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1915—Gross Tons

	1915	1916	1917	1918	1919
Jan.	1,601,421	3,185,121	3,150,938	2,411,768	3,302,260
Feb.	1,674,771	3,087,212	2,645,247	2,319,299	2,940,168
Mar.	2,063,834	3,337,691	3,251,352	3,213,091	3,090,243
Apr.	2,116,494	3,227,768	3,334,960	3,288,211	2,478,218
May	2,263,470	3,361,073	3,417,340	3,446,412	2,108,056
June	2,380,827	3,211,588	3,270,055	3,323,791	2,114,863
July	2,563,420	3,224,513	3,342,438	3,420,988	2,428,541
Aug.	2,779,647	3,203,713	3,247,947	3,389,585	2,743,388
Sept.	2,852,561	3,202,366	3,133,954	3,418,270	2,487,965
Oct.	3,125,491	3,508,849	3,303,038	3,486,941	1,863,558
Nov.	3,037,308	3,311,811	3,205,794	3,354,074	2,392,350
Dec.	3,203,322	3,178,651	2,882,918	3,433,617	2,633,268
Total, yr*	29,662,566	39,039,356	38,185,981	38,506,047	30,582,878

*These totals do not include charcoal pig iron. The 1918 production of this iron was 347,224 tons.

Blast Furnace Notes

Jackson Iron & Steel Co., Jackson, Ohio, blew in its blast furnace Jan. 6 after a six months shut-down because of the strike. Star and Globe furnaces in the same district are undergoing repairs and expect to resume in 30 to 60 days.

The blast furnace at Rockdale, Tenn., of J. J. Gray, Jr., will be blown in about Jan. 10.

Hannah furnace of the Republic Iron & Steel Co. at the Mahoning valley works was blown in Jan. 2, after having been idle since the steel strike started. All Ohio furnaces of the company are now blowing except No. 1 in the Haselton group. Twenty-two of 27 stacks are now pouring in the Mahoning Valley.

Monessen furnace No. 1 of the Pittsburgh Steel Co., Monessen, Pa., blew in Jan. 2.

The Lackawanna Steel Co. blew in its No. 5 blast furnace Jan. 4.

Lochiel furnace of the American Manganese Mfg. Co., near Harrisburg, Pa., was blown in last week. Since the furnace went out last March it has been relined and new down comers, dust catcher and gas mains have been provided. At the same time the entire plant has been overhauled.

The Empire Steel & Iron Co., Oxford, N. J., discontinued operations at its blast furnace, Dec. 27, for relining and repair work. It is expected to be out of commission for about six or eight weeks.

Effective Jan. 1, the Bethlehem Steel Co. placed its No. 3 furnace at the Steelton, Pa., works in blast. The plant has been idle for some months past.

Jan. 1 the Stewart Iron Co. at Sharon, Pa., lighted its stack and resumed in all departments after a three months shut-down precipitated by the strike of iron and steel workers. During the layoff repairs were made and the plant was completely overhauled. Several times after the strike started men reported in large groups, expressing a willingness to return, but the company decided to complete its rehabilitation.

"New" British Super High Speed Steel

Molybdenum as a Substitute for Tungsten —Nothing New in Recent Announcements—Opinions of American Steel Men

MUCH interest has been aroused among American metallurgists and steel makers by the announcement in the London *Daily Mail* that a new steel far in advance of any high speed steel hitherto made had been invented by Prof. John Oliver Arnold of Sheffield University. Some of the claims made for the new steel are: Unrivaled hardness, longer life, greater commercial possibilities, ability as a tool to remove a greater weight of metal than any other steel. The press reports cabled to the United States indicated that Professor Arnold uses molybdenum instead of tungsten as a component of this steel, and comment on this phase of the announcement was made in THE IRON AGE last week.

The article in the London paper really reveals nothing beyond what was brought out in a paper before the Iron and Steel Institute in May, 1919, in which Professor Arnold gave the properties of two molybdenum high speed steels and compared them with other high speed steels. There was nothing in these results which had not been known in the United States previously. There have been some intimations, in fact, that the British newspaper article was inspired propaganda for molybdenum.

THE IRON AGE has sought the views of several American metallurgists on the London announcement, and quotes from their opinions below:

The Role of Vanadium

George L. Norris, metallurgical engineer, Vanadium Co. of America, New York, makes the following comment:

"There is no doubt that the steel referred to in the British articles is the chrome-molybdenum-vanadium steel described in the paper presented by Professor Arnold and Fred Ibbotson before the Iron and Steel Institute at the May meeting last year in London. The title of that paper is 'The Molecular Constitutions of High Speed Tool Steels and Their Correlations with Lathe Efficiencies.' Six steels are considered, whose compositions were as follows:

Steel No.	Carbon, Per Cent	Chromium, Per Cent	Tungsten, Per Cent	Molybdenum, Per Cent	Vanadium, Per Cent
1574	0.75	2.79	.....	5.79	1.29
1575	0.72	2.79	.....	5.72	....
1576	0.76	2.82	12.12	2.06	1.28
1577	0.62	2.79	12.00	2.06	....
1578	0.55	2.62	15.93	....	1.16
1579	0.60	2.78	15.54	....	....

"The first one of these, No. 1574, is the steel on which the recent publicity has been based. A study of the lathe efficiencies of these steels shows that those containing vanadium are far more efficient than when vanadium is absent. This is particularly true of the chrome-molybdenum steel, whose efficiency is increased 98 per cent by the addition of 1.29 per cent of vanadium.

"The following tabulation shows the relative efficiency of these steels and the percentage of increased efficiency due to the presence of vanadium:

Steel No.	Type	Efficiency Position	Ave. Lb. Steel Cut	Increased Ave. Efficiency a/c Vanadium Per Cent	Increased Ave. Efficiency a/c Molybdenum Per Cent
1574	Cr Mo V	1	18.6	98	..
1575	Cr Mo	6	9.4	..	..
1576	Cr W Mo V	3	16.0	28	..
1577	Cr W Mo	4	12.5	..	12.6
1578	Cr W V	2	18.3	65	..
1579	Cr W	5	11.1	..	..

"It is interesting to note that the increased efficiency of steel No. 1577 over steel No. 1579 is only 12.6 per cent. The chrome-tungsten steel, No. 1579, is 18 per cent better than the chrome-molybdenum steel, No. 1575.

"It is evident from the lathe tests as summarized in the above tabulation that the efficiency of steel No. 1574 is due to the presence of 1.29 per cent vanadium, and the following quotation from Professor Arnold's paper is evidence that this was his opinion also, as could hardly have been otherwise in face of the facts.

An interesting comparison is found in the mean relative efficiencies of steels No. 1574 and No. 1575, which are respectively 18.6 and 9.4, and, owing to the well-known erratic behavior of molybdenum steel, No. 1575 is the only steel of the whole series which broke in the lathe. Hence about 1.2 per cent vanadium has prevented water-cracking and raised the cutting efficiency of the steel 98 per cent.

"The average efficiency, pounds of steel cut, is practically the same for the chrome-molybdenum steel (No. 1574) and the chrome-tungsten-vanadium steel (No. 1575).

"Providing then that the addition of 1.25 per cent to 2 per cent of vanadium will effectually and in all instances overcome the 'well-known erratic behavior of molybdenum' referred to by Professor Arnold, it is possible that steel of the type of No. 1574 will have some application for high speed tools.

"It is evident from the above that there is no possibility of molybdenum replacing vanadium in high speed tool steel, as in fact the addition of vanadium is essential for the success of molybdenum high speed tool steel. Nor is it probable that molybdenum will replace tungsten in high speed tool steel."

Opinion of an American Tool Steel Maker

E. T. Clarage, president Columbia Tool Steel Co., Chicago Heights, Ill., writes as follows:

"It is unfortunate that a man like Professor Arnold, who has attracted more or less attention on account of some good work he has done in metallurgy, should make himself ridiculous and put himself in such an untenable position in an effort to obtain personal notoriety and to boost the Sheffield tool steel industry. This is the second time he has done this. He came out a few years ago with a bombastic claim which was cabled to all the papers in this country about a new wonderful high speed steel. It transpired later that he had in mind a steel containing 1 per cent vanadium. He had evidently just learned of this, although such steel had been manufactured in this country and Dr. John A. Mathews had applied for and secured a patent covering the manufacture.

"One would think from the British press article that molybdenum had just been discovered. As a matter of fact, it has been used in high speed steel experimentally as a substitute for tungsten for the last 20 years. At least 15 years ago the Sanderson Works at Syracuse, N. Y., brought out a steel which was sold under the name of 'Blitz.' This was a chrome-molybdenum steel containing 7 to 8 per cent molybdenum. The popular saying among mill men was that molybdenum was 'twice as powerful as tungsten'; that is, 9 per cent molybdenum would replace 18 per cent tungsten. This is entirely due to the difference in the weight of the material. The specific gravity of tungsten is 18.77 and molybdenum is 10.281; therefore, it would take 9.81 per cent molybdenum by weight to furnish the same bulk as 18 per cent by weight of tungsten. If you use 9.81 per cent molybdenum you are using just as much alloy as if you use 18 per cent tungsten. The only difference is that the tungsten weighs nearly twice as much.

"The Sanderson company abandoned this molybdenum steel on account of its brittleness. It was exceedingly red short and the mill loss was very great, in addition to which it was no better and probably not quite so good as the tungsten steels. Practically all the other American manufacturers have experimented with mo-

lybdenum in all percentages and have decided that it is not as good as tungsten in the manufacture of high speed steel.

"There is a field for molybdenum which Professor Arnold probably has not yet learned of. In homeopathic doses of approximately one-half of 1 per cent, molybdenum is an exceedingly good alloy for low carbon automobile steels where great strength is required and where such parts are subject to case-hardening and heat treatment. The molybdenum steels may take the place of the chrome-vanadium steels eventually for the reason that chrome-vanadium steel has a very narrow range of temperature within which it must be heat treated. It is necessary to quench carbonized parts first at a high heat to refine the low carbon interior structure and again at a lower heat to refine the carbonized exterior. The quenching temperature of these molybdenum steels has very much wider range, and it is possible to quench at a heat which will refine both the carbonized surface and the low carbon interior. and automobile manufacturers, therefore, save the expense of one heat treatment. There is plenty of molybdenum and it can be bought at a price that would make the cost of molybdenum high speed steel in the proportion that Professor Arnold gives considerably less than an 18 per cent tungsten steel."

Molybdenum Steel Not New

An experienced steel manufacturer says among other things in a personal letter:

"I have no means of knowing whether Professor Arnold has made any great discovery or not. In the paper which was published last June before the British Iron and Steel Institute, which gave the results of various cutting tests, in his series of steels a molybdenum-chrome-vanadium steel stood at the head of the list. Unless he has something that is a radical departure from other molybdenum high speed steels that have been tried in the past, I am very much surprised to note that he gives the matter any publicity at all, since the Darwin & Milner Co. are at the present time engaged in exploiting a molybdenum high speed steel.

"I have experimented with molybdenum high speed steels containing 4 to 15 per cent molybdenum, with and without chromium, vanadium, uranium and cobalt. Some of them have given very good results, but do not seem to be dependable; that is, it is difficult to reproduce the material from time to time so as to get consistent results.

"There is too much of an air of mystery surrounding this so-called discovery to permit us to make any intelligent comments. The same was true when Professor Arnold described the new steel some 20 years ago which later proved to be a vanadium high speed steel and the exact duplicate of an American steel which had been on the market three years earlier. At that time he did not mention what it was that caused the improvement in the product he was describing to the London audience.

"We have recently made some very exhaustive tests of our own and other makes of high speed steel, including various molybdenum steels, and have found that in general the latter are considerably below the best tungsten high speed steels in efficiency. I see no occasion to get excited or alarmed over this announcement."

Views of Other Metallurgists

Some of the interviews New York papers have had with American metallurgists and steel makers are interesting and are reproduced in part as follows:

"It is possible that Professor Arnold has learned how to use molybdenum so that it will not be sweated out of the steel by constant forging," said Frank B. Carney, of Carney & Lindemuth, New York, formerly o. the Bethlehem Steel Co. "Unless he has done this he has not discovered anything new."

"Professor Arnold is not the inventor of the use of molybdenum in steel," said William Campbell, professor of metallurgy, Columbia University, and metallurgist of the Brooklyn Navy Yard. It was rumored during the war that the Germans used molybdenum steel in the manufacture of big guns, and we carried on extensive experiments here in that line. The steel proved no better than that normally used."

B. F. Phillipson, president of the Climax Molybdenum Co., New York, said that molybdenum steel has been developed in the United States during the last two years in a manner which overshadows the invention claimed by Professor Arnold. "This British steel," he said, "is used for cutting tools. American experts have developed a similar article which is used for automotive parts, such as the crankshafts of airplane motors, and for the light armor used on tanks. It is used in the Liberty motor and was an important part of the NC-4. It is also employed in the manufacture of Renault baby tanks. The Fifth Avenue buses have it in their springs. The Arnold formula calls for the use of the following elements: Carbon, 0.75 per cent; chromium, 2.79 per cent; molybdenum, 5.70 per cent, and vanadium 1.29 per cent. No tungsten is used. This is practically the same as the formula used by the Germans, a copy of which has just reached me. American automotive molybdenum steel is made with about 1 per cent of molybdenum instead of nearly 6 per cent."

This "'Arnold formula" was shown to Professor Campbell and Mr. Carney. Both said there was nothing new in it.

Export Rates on Iron and Steel Sustained

WASHINGTON, Jan. 6.—Establishment of export rates on iron and steel from interior points to the Pacific Coast for the purpose of diverting traffic from Eastern ports is justified in findings of the Interstate Commerce Commission. The case on which the issue was raised was that of the Inland Steel Co., the Northwestern Barb Wire Co. and the Illinois Manufacturers' Association against the Director General of Railroads. The complainants objected to the fact that export rates to the Pacific Coast on iron and steel articles are 60c. per 100 lb. from both Chicago and Pittsburgh, the two steel producing centers. Because of the fact that Pittsburgh has an advantage in the freight rate to the Eastern seaboard, it was contended that Chicago properly should have a similar advantage on shipments to the Western coast. It was urged that the rate from Chicago to the Pacific Coast should be at least 12.5c. lower than the rate from Pittsburgh, the complainants being willing that the Chicago rate should remain at its present figure if the Pittsburgh rate were increased.

In the report of the commission, holding that the rates are not unreasonable or unduly prejudicial, Commissioners McChord, Meyer and Daniels say:

"Complainants urged that if Pittsburgh, by reason of its location and lower rates to the Atlantic seaboard, is to have an advantage of $3.80 per ton in rates for export to Europe, Africa, and South America, Chicago, by reason of its location, is entitled to an advantage in rates on export traffic to the Orient. This contention, however, overlooks the fact that the rate from Pittsburgh to the Pacific Coast is made to enable competition with the route through the Atlantic seaboard and, if low rates were not made over this route, the movement from Pittsburgh and from Chicago, if any, would be through the Atlantic ports.

"The conditions at the port of New York have been considerably improved, and complainants urge that, as relief from congested conditions is no longer necessary, the difference in rates, Pittsburgh higher than Chicago, should be restored. Defendants urge that larger movement through Atlantic ports would result in the ships used in this export business bringing through such ports oriental trade which might otherwise come through Pacific Coast ports.

"If the rate from Pittsburgh to Pacific ports were increased, Pittsburgh still has the benefit of the rate via the Atlantic ports, and if the rate from Chicago should be made without relation to the rate from Pittsburgh, but such as to enable competition through Atlantic ports, it would approximate 75 cents. It is difficult to see wherein Chicago would materially benefit by the establishment of a higher rate from Pittsburgh when Pittsburgh mills would still have the benefit of the route through Atlantic ports at lower rates."

Iron and Steel Markets

RAIL BUYING AT CHICAGO

Financing Arranged with Government

Pig Iron Output Increased in December—Trouble from Car Shortage

That the railroads are in urgent need of rails appears from the definite closing of about 250,000 tons in the Chicago district on which rolling will begin at once. These sales were made possible by verbal agreements of the Railroad Administration to honor railroad corporation purchases in these closing weeks of Government control.

In addition to the rails closed, orders for between 100,000 and 150,000 tons have been tentatively placed at Chicago. The Illinois Steel Co. will roll 40,000 tons each for the Rock Island and Union Pacific, 30,000 tons for the Great Northern, 12,000 tons for the Soo Line, 10,000 tons for the Chicago & Alton, 6000 tons for the Monon and 5000 tons for the Minneapolis & St. Louis. The Lackawanna Steel Co. will supply 15,000 tons for the Great Northern and 10,000 tons for the Northern Pacific. The Santa Fe will close shortly for 70,000 tons, of which two-thirds will be rolled by the Colorado mill and one-third at South Chicago, and the St. Paul has reserved space for 20,000 tons. The Clover Leaf has bought 5000 tons and for the Nickel Plate a 7500-ton contract is pending. The Rock Island has bought 15,000 tons of tie plates and the Santa Fe program includes heavy tonnages of spikes, track bolts and tie plates.

In cars and locomotives there has been no such activity as in rails. While advance estimates of locomotive requirements are around 2000, as yet only two or three roads have put out definite inquiries.

The Union Pacific's inquiry for 3000 refrigerator cars stands almost alone. These will require 21,000 tons of plates, shapes and bars and 4000 tons of axles. The New York Central is asking for 15,000 tons of steel for rebuilding 3000 freight cars.

The amount of inquiry put before the steel companies from both export and domestic buyers in the first week of the year has been large in all the principal markets, but on much of it the mills have been unable to quote. In particular bars, pipe, sheets, rods, wire products and semi-finished steel are scarce, in some cases to the point of limiting manufacturing operations of consumers.

Car shortage is making trouble. Output of iron and steel would be larger if coal and coke deliveries kept pace with the increase in coal production.

The pig iron returns for December show further good recovery from the effects of the coal strike, in a month often marked by holiday bankings. Output for the 31 days was 2,633,268 tons, or 84,944 tons a day, against 2,392,350 tons in the 30 days of November, or 79,745 tons a day. Twenty-two furnaces blew in last month and 11 blew out, so that on Jan. 1 the estimated capacity of the 262 furnaces in blast was 87,945 tons a day, against 84,550 tons a day for 251 furnaces on Dec. 1. Estimating charcoal pig iron at 360,000 tons, total pig iron production in 1919 was close to 31,000,000 tons, which compares with 39,054,000 tons in 1918.

More is heard of reduced operations at automobile plants for lack of steel. Stocks that were drawn upon during the steel strike cannot now be replaced. An inquiry for alloy steel covering a Detroit maker's requirements for 1920 is large beyond all precedent.

New structural business in the Central West is growing. At Pittsburgh five contracts just taken by fabricating shops amounting to 7500 tons were all for manufacturing extensions.

Unsatisfied demand for line pipe is piling up. The Middle States Oil Co. has asked for 200 miles of 10-in. pipe. The Texas Co. is buying wherever a mill opening can be found.

More pig iron sales are reported at the $40 figure that for some weeks has been considered a goal. Inquiry for the second half is only occasional. At Chicago a 2500-ton sale of No. 2 foundry for that delivery was at $40.

Ferromanganese is scarce and higher. Domestic producers are out of the market for first half and only a small British supply is available for that delivery at $140 seaboard. A carload of spot domestic alloy has brought $150, delivered, and the quotation for last half is now $140. Manganese ore is scarce both here and in Great Britain.

In the face of a provisional settlement of the molders' strike, pig iron prices in Great Britain have been given a horizontal advance of 15s., putting foundry iron, at to-day's rate of exchange, at $34.70 for home consumers and 95c. per ton higher for export.

The rise in British steel prices continues. Billets are $2 to $4 per ton higher; galvanized sheets $5.50 to $9.50 higher, and tin plate now commands more than $10 per box.

Pittsburgh

PITTSBURGH, Jan. 6.

The activity in demand for pig iron, semi-finished steel and finished steel products, referred to in our report of last week, shows no abatement with the single exception that the inquiry for Bessemer and basic iron has not been so active in the last few days, being largely for the reason that consumers are pretty well covered, and also because it is very hard to find any sellers of Bessemer or basic that have any iron to offer. The inquiry for tin plate is also quieter, but this is because the output for first half of the year is all sold and specifications against contracts are reported coming in very freely.

The shortage in cars is making a lot of trouble. Deliveries of coke to the blast furnaces and coal to the manufacturing plants are very slow and are keeping down output to some extent. There is no doubt that plenty of coal is being mined and producers say they have plenty to sell, but are running very short of cars and are piling up pretty heavy stocks. It is believed, however, that within two or three weeks the supply of cars will be much better and coal and coke will go forward more promptly.

The heavy demand for billets and sheet bars and also for finished steel that has featured the market for several months is still keeping up and there is no doubt that there is a genuine shortage in supply of steel that is going to be felt over probably the next six months. The large steel companies report they have very little steel to sell for first quarter and have booked a good deal of business for second quarter at open prices to

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Jan. 6, 1920	Dec. 30, 1919	Dec. 9, 1919	Jan. 7, 1919
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia‡	**$44.35**	$43.10	$40.10	$36.15
No. 2, Valley furnace†	39.00	39.00	36.00	31.00
No. 2 Southern, Cin'ti†	**40.60**	39.60	38.60	34.60
No. 2, Birmingham, Ala†	**37.00**	36.00	35.00	31.00
No. 2, furnace, Chicago*	40.00	40.00	40.00	31.00
Basic, del'd, eastern Pa.	39.00	39.00	35.00	33.90
Basic, Valley furnace	36.00	36.00	34.00	30.00
Bessemer, Pittsburgh	38.40	38.40	36.40	33.60
Malleable, Chicago*	40.50	40.50	40.50	31.50
Malleable Valley	38.00	38.00	35.00	31.50
Gray forge, Pittsburgh	38.40	38.40	36.40	31.40
L. S. charcoal, Chicago	45.00	45.00	42.50	38.85
Rails, Billets, Etc.,				
Per Gross Ton:				
Bess. rails, heavy, at mill	45.00	45.00	45.00	55.00
O.-h. rails, heavy, at mill	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh	48.00	48.00	45.00	43.50
O.-h. billets, Pittsburgh	48.00	48.00	45.00	43.50
O.-h. sheet bars, P'gh	50.00	50.00	48.00	47.00
Forging billets, base, P'gh.	64.00	64.00	60.00	56.00
O.-h. billets, Phila.	59.00	59.00	54.00	47.50
Wire rods, Pittsburgh	60.00	60.00	60.00	57.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	3.745	3.745	3.245	3.745
Iron bars, Pittsburgh	3.50	3.50	3.25	3.50
Iron bars, Chicago	**3.40**	2.90	2.77	3.17
Steel bars, Pittsburgh	2.75	2.75	2.75	2.70
Steel bars, New York	3.27	3.27	3.12	2.97
Tank plates, Pittsburgh	2.65	2.65	2.65	3.00
Tank plates, New York	3.02	3.02	2.92	3.27
Beams, etc., Pittsburgh	2.45	2.45	2.45	2.80
Beams, etc., New York	2.82	2.82	2.72	3.07
Skelp, grooved steel, P'gh.	2.45	2.45	2.45	2.70
Skelp, sheared steel, P'gh.	2.65	2.65	2.65	3.00
Steel hoops, Pittsburgh	3.25	3.25	3.25	3.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

	Jan. 6, 1920	Dec. 30, 1919	Dec. 9, 1919	Jan. 7, 1919
Sheets, Nails and Wire.				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	4.35	4.35	4.35	4.70
Sheets, galv., No. 28, P'gh.	5.70	5.70	5.70	6.05
Wire nails, Pittsburgh	4.50	4.50	4.00	3.50
Plain wire, Pittsburgh	3.25	3.25	3.25	3.25
Barbed wire, galv., P'gh.	4.45	4.45	4.45	4.35
Tin plate, 100-lb. box, P'gh.	$7.00	$7.00	$7.00	$7.35
Old Material,				
Per Gross Ton:				
Carwheels, Chicago	**$34.50**	$31.00	$30.00	$26.00
Carwheels, Philadelphia	**33.00**	30.00	30.00	25.00
Heavy steel scrap, P'gh.	**26.00**	25.00	24.00	20.00
Heavy steel scrap, Phila.	**23.50**	22.50	22.50	18.00
Heavy steel scrap, Ch'go.	**24.00**	23.50	20.50	18.00
No. 1 cast, Pittsburgh	**32.00**	30.00	30.00	25.00
No. 1 cast, Philadelphia	33.00	33.00	30.00	24.00
No. 1 cast, Ch'go, net ton	**35.50**	33.50	29.50	24.00
No. 1 RR. wrot, Phila.	**32.00**	31.00	30.00	25.00
No. 1 RR. wrot, Ch'go (net)	**25.00**	24.00	23.00	21.50
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$6.00	$6.00	$6.00	$6.00
Furnace coke, future	6.00	6.00	6.00	6.00
Foundry coke, prompt	7.00	7.00	7.00	7.00
Foundry coke, future	7.00	7.00	7.00	7.00
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	**19.75**	19.50	19.00	21.00
Electrolytic copper, N. Y.	**19.50**	19.25	18.50	21.00
Spelter, St. Louis	**9.50**	9.00	8.37½	7.50
Spelter, New York	**9.85**	9.35	8.72½	7.85
Lead, St. Louis	**8.25**	7.50	6.65	5.45
Lead, New York	**8.50**	7.75	6.90	5.75
Tin, New York	**63.50**	58.25	54.00	71.50
Antimony (Asiatic), N. Y.	**9.75**	9.62½	9.50	7.62½

be fixed at time of shipment. The scarcest article in the whole list of finished steel is sheets, most mills having orders on their books that will take about all they can make over first half.

The market is very firm, two makers having advanced prices on ferromanganese $10 per ton, and a general advance of $10 per ton is looked for in oil well supplies to come at any time.

Pig Iron.—Inquiry for Bessemer and basic iron has quieted down a little, consumers being pretty well covered over first quarter and furnaces having very little to sell for that delivery. There is still an active inquiry for foundry iron, but two or three leading makers are absolutely out of the market and are not quoting on any new inquiries. Output of pig iron is increasing and for December showed a large gain over the previous months. We note a sale of 2000 tons of No. 2 foundry iron at $39, Valley furnace, for January and February shipment, and there is a reported sale of 800 tons of Bessemer for prompt shipment at the same price. There is a shortage in supply of pig iron and still higher prices are predicted. We quote as follows:

Basic	$36.00
Bessemer	37.00
Gray forge	37.00
No. 2 foundry	39.00
No. 3 foundry	38.50
Malleable	38.00

Semi-Finished Steel.—It is said that two or three sheet mills that have a larger capacity for melting steel than they have for rolling sheets have lately sold fairly large lots of sheet bars to be converted into sheets by other mills at as high as $55 per ton at mill. However, this price is above the market and represents the extremes to which some consumers of sheets have been driven in order to obtain them. The price of the Steel Corporation interests on sheet bars is still $42, but sales have been made at prices ranging all the way to $55. This is also true in billets, which have sold at $10 per ton, or more, above the March 21 schedule. For prompt delivery mills that have any steel to sell are quoting about as follows:

We quote 4 x 4 in. soft Bessemer and open-hearth billets at $48; 2 x 2-in. billets at $48 to $50; slabs, $48; sheet bars, $50, and forging billets, $64 to $66 base, all f.o.b. at mill Pittsburgh or Youngstown.

Ferroalloys.—It is said that two makers of domestic ferromanganese have advanced their price squarely to $140 per ton, delivered, for 76 to 80 per cent. All makers are now quoting 76 to 80 per cent instead of 78 to 82 per cent content, as formerly. Last week there was a sale of 1200 tons of English 76 to 80 per cent ferromanganese at $125 per ton, c.i.f. Baltimore, for second quarter delivery, and also a sale of 400 tons of 76 to 80 per cent domestic ferromanganese for same delivery at $130 per ton, delivered. On recent inquiries two makers are quoting $140 for domestic and say this is their minimum price. The supply of 50 per cent ferrosilicon seems ample to meet all needs and there is no trouble in getting prompt delivery.

We quote 76 to 80 per cent domestic ferromanganese $140 for second quarter and first half delivered, with a reduction of $1.50 to $1.75 per unit for lower percentages. We quote 50 per cent ferrosilicon at $80 to $85, and 18 to 22 per cent spiegeleisen at $43 to $45, delivered. Prices on Bessemer ferrosilicon are: 9 per cent, $56.50; 10 per cent, $59.50; 11 per cent, $62.50; 12 per cent, $66.10. We quote 6 per cent silvery iron, $43.75; 7 per cent, $48.00; 8 per cent, $50.00; 9 per cent, $52.00, and 10 per cent, $54.50. An advance of $3.30 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on Bessemer ferrosilicon, and an advance of $2.50 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on silvery iron. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, which have a uniform freight rate of $2.90 per gross ton for delivery in the Pittsburgh district.

Structural Material.—Inquiry continues very active, a large amount of work being figured on, and fabrication shops are getting pretty well filled up. The American Bridge Co. has taken 3000 tons for new steel buildings for the Libby-Owens Glass Co., Kanawha City, W. Va. The McClintic-Marshall Co. has taken 1200 tons for new steel buildings for Williams, White & Co., Moline, Ill.; 2000 tons for General Electric Co., Erie, Pa.; 1000 tons

for a foundry building for Manning, Maxwell & Moore, Muskegon, Mich., and 300 tons for a girls' dormitory building for the Goodrich Rubber Co., Akron, Ohio. The price of plain material remains at 2.45c., Pittsburgh, this price being quoted by the two local makers.

Beams and channels up to 15 in., 2.45c., Pittsburgh, large lots.

Plates.—There is a genuine scarcity in supply of plates and a sale of 400 tons for prompt shipment has been made at 3.25c., Pittsburgh, the seller paying a freight rate of about 7c. It is announced that the Pullman Co. will build at once 500 sleeping cars to meet the shortage in supplies and plates and shapes will likely go to a Chicago mill. The Carnegie Steel Co. continues to quote 2.65c. on plates of tank quality, ¼ in. and heavier, and this price is being met by two or three local mills to regular customers, but some of the smaller mills have no trouble in getting 3c. and higher for plates for first quarter delivery. We therefore quote ¼ in. and heavier sheared plates of tank quality at 2.65c. to 3.25c. at mill, Pittsburgh, prices depending entirely on whether the quotation is to a regular customer, also on the quantity involved and delivery wanted.

Sheared tank plates, ¼-in. and heavier, at 2.65c. to 3c., Pittsburgh, depending on order and delivery.

Sheets.—The American Sheet & Tin Plate Co. and most independent mills are operating to over 90 per cent of capacity, but owing to lack of efficiency among the men and for other causes the output of sheets is probably not more than 75 per cent of normal capacity. Some consumers that are in distress for sheets are buying sheet bars, paying as high as $55 for them, and having these bars converted into sheets at so much per ton. Leading mills have their output of sheets well sold up for first half of this year and some mills are obtaining premiums over the March 21 schedule of $5 to $10 per ton. Prices of the leading interest and also of most of the independent mills to their regular customers are on the March 21 schedule, as follows:

We quote No. 28 gage black sheets at 4.35c.; No. 28 galvanized, 5.70c., and No. 10 blue annealed, 3.55c., these being the March 21 prices at which the bulk of the tonnage in sheets for first quarter and first half of this year has been sold.

Tin Plate.—The output of tin plate for first half of this year has been sold and some mills have already received specifications against contracts for delivery as far ahead as June next. The output of tin plate is heavy, several of the larger local mills reporting they are running to 100 per cent and others to 90 per cent. Export inquiry is active and for export shipment several mills are quoting $8 to $8.50 per base box. We quote tin plate for domestic consumers at $7 per base box at mill, Pittsburgh, for first half.

Wire Products.—There is still an acute shortage in supply of wire nails, and all kinds of prices are being paid. One leading independent has sold a limited tonnage recently of wire nails at $4 base per keg and another mill has also sold at $4.25 base per keg. We continue to quote wire nails at $3.25 base up to $4.50, plain wire 3c. to 3.50c. base in carloads and larger lots, the lower prices named being those of the leading interest, but for indefinite delivery.

Wire Rods.—A leading independent producer sold recently 500 tons of soft open-hearth rods at $60 at mill, but other sales are reported to have been made above that figure. The demand is active and the supply limited. We quote soft Bessemer and open-hearth rods at $52 up to $60 and $65 at mill, the lowest price named being that of the leading interest.

Iron and Steel Pipe.—The mills are simply snowed under with business, and one leading local maker of steel pipe is out of the market as a seller, except on small lots that it may have to offer from time to time. It is said the National Tube Co. now has obligations that will take its entire output of tubular goods over the remainder of this year. A leading maker will likely announce an advance of $10 per ton on all oil well tubular goods within a few days. There are inquiries in the market by the score for line pipe, among these being one from the Middle States Oil Co. for 200 miles of 10-in. 40-lb. pipe. The Texas Co. is placing orders right along for oil well tubular goods wherever it can find a mill in position to take them. Discounts on iron and steel pipe are given on page 163, and are those in effect from March 21 last.

Nuts, Bolts and Rivets.—Makers report the demand is heavy and they are well sold up over first quarter. Some business has also been placed by several consumers for second quarter, prices being left open and are to be those in effect at the time shipments are made. Large orders have been placed for rivets for first quarter on the basis of $4.10 for large structural and ship rivets and $4.20 for large boiler rivets per 100 lb., f.o.b. Pittsburgh. Discounts in effect on bolts, nuts and rivets by most makers are given on page 163.

Boiler Tubes.—Makers report the demand for locomotive and merchant tubes very active, and they are well sold up over first quarter. Discounts on March 21 last on iron and steel tubes as given on page 163 are now reported to be firmly held.

Iron and Steel Bars.—The leading maker of bars in this district has covered its regular customers for first quarter delivery at 2.35c. at mill, but other makers are quoting as high as 2.75c. and getting orders at that price. There is a great scarcity in supply of steel bars and it promises to last for some time. The loss of production during the steel strike is now being severely felt.

We quote steel bars rolled from billets at 2.75c. and from old steel rails, 3c. Pittsburgh mills rolling iron bars quote, at 3.50c. Pittsburgh, plus full freight rate to point of delivery.

Hot-Rolled Strip Steel.—The demand for some months has been very heavy, and makers of hot-rolled strip steel have covered consumers and jobbers over first quarter at prices ranging from 3.50c. to 3.75c. per lb. at mill, while some makers have set aside reservations for regular customers, covering their needs for second quarter, prices to be those in effect at the time shipment is made. All makers of hot-rolled strip steel are pretty well sold up over first half of this year, and the market is very strong. Mills quote in large lots to regular customers at 3.50c. to 3.75c. per lb. f.o.b. Pittsburgh. It is stated a few small sales have been made at as high as 4c. at mill.

Cold-Rolled Strip Steel.—Mills have covered their regular trade over first quarter at a minimum price of 6c. per lb. f.o.b. mill, Pittsburgh, and it is said that in a few cases, sales have been made of as high as 7c. per lb., but this is above the regular market. Makers are well sold up over first quarter, and on request of regular customers, have reserved considerable tonnage for them for second quarter delivery, the price to be that in effect at the time shipments are made. The market is very firm, and it is stated none of the mills has sold below 6c. per lb. for first quarter delivery. We quote hot-rolled strip steel for deep stamping and other special purposes, at 6c. per lb. at mill in large lots, and up to 6.50c. in small lots.

Cold-Rolled Steel Bars.—Makers report a very heavy demand, and have their output very well sold up over first quarter of this year. The demand from the builders of automobiles is especially heavy, and is taking a good part of the output of cold-rolled steel bars, and other specialties used by automobile makers. Most contracts now on the books of the makers are at 3.60c. per lb., but it is said some sales have been made at as high as 4c. per lb. We quote cold-rolled steel bars at 3.60c. to 4c. per lb. f.o.b. Pittsburgh, the price depending on the quantity and the delivery wanted.

Coke.—The supply of cars is still very short, but was a little better on Monday, Jan. 5, averaging on that day from 50 to 60 per cent of normal. However, this will not likely keep over the remainder of this week. The present acute shortage in supply of cars is likely to last over the next month or two, and all the blast furnaces in the Pittsburgh and Valley districts are running short of coke. The supply of labor for loading the limited number of cars placed at the ovens is ample to load these cars, but if there was a 100 per cent supply of cars, there would be a shortage in labor. There is a heavy demand for spot furnace coke, but very little is being sold, producers shipping their coke output to furnaces with which they have contracts. Government

prices are still in effect, these being $6 for spot and future furnace coke, and $7 for spot and future 72-hr. foundry coke, in net tons at oven. Output of coke in the upper and lower Connellsville regions for the week ending Dec. 27, 1919, was 205,850 tons, a decrease below the previous week of 41,334 tons.

Spikes.—The inquiry for standard railroad spikes has been very active for some time, the United States Railroad Administration sending out new inquiries freely, and some business has been placed. The New York Central has an inquiry out for upwards of 20,000 kegs, the Norfolk & Western for 5000 to 6000 kegs and the Atchison, Topeka and Santa Fé for about 5000 kegs. The Baltimore & Ohio has placed one order for 5000 kegs with a local maker, and is said to have bought heavily from other sources. Two local makers say they are well sold up on standard spikes over first quarter, and have some orders on their books for second quarter delivery. Prices are reported to be very firm.

We quote standard spikes, 9/16 x 4½ in., at $3.35 base per 100 lb. in carload lots of 200 kegs of 200 lb. each, and small spikes, ⅜ in., 7/16 in. and smaller, at $4.25 per 100 lb. in carload lots of 200 kegs of 200 lb. each, plus usual extras. Boat and barge spikes, $4.25 per 100 lb. in carload lots of 200 kegs of 200 lb. each, f.o.b. Pittsburgh. For less than carload lots 1c. per lb. higher is asked.

Old Material.—Nearly all local consumers of scrap are anxious to buy, but dealers are not inclined to sell, feeling sure they will get higher prices for their scrap within a very short time. At present the price of basic iron is about $10 per ton higher than that of heavy steel scrap, and dealers claim this difference cannot be maintained, and that prices of heavy steel melting scrap and other grades of scrap used for open hearth purposes, are bound to advance. Local dealers are very bullish on the outlook, and firmly believe that nearly all grades of scrap will be $2 to $3 a ton higher in a short time than they are now. It is said sales of heavy steel scrap have been made at $26 and $26.50 delivered to consumers' mills, and even $27 is claimed to have been done. We have again advanced prices on nearly all grades of scrap from $1 to $2 per ton, and the market is very firm, and likely to be higher in the near future. We quote for delivery to consumers mills in the Pittsburgh and other districts that take Pittsburgh freight rates, as follows:

Heavy steel, melting, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	$26.00 to $26.50
No. 1 cast for steel plants	32.00 to 33.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Franklin, Pa., and Pittsburgh	33.00 to 34.00
Compressed steel	22.00 to 23.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh district	18.00 to 19.00
Bundled steel stamping	16.50 to 17.00
No. 1 busheling	25.00 to 26.00
Railroad grate bars	24.00 to 25.00
Low phosphorus melting stock (bloom and billet ends, heavy plates) ¼ in. and heavier	30.00 to 31.00
Railroad malleable	26.00 to 27.00
Iron car axles	34.00 to 35.00
Locomotive axles, steel	33.00 to 34.00
Steel car axles	31.00 to 32.00
Railroad malleable	26.00 to 27.00
Cast iron wheels	33.00 to 34.00
Rolled steel wheels	27.00 to 28.00
Machine-shop turnings	15.00 to 15.50
Sheet bar, crop ends (at origin)	30.00 to 30.50
Heavy steel axle turnings	20.00 to 21.00
Heavy breakable cast	25.00 to 26.00
Cast iron borings	18.00 to 19.00
No. 1 railroad wrought	27.00 to 28.00

Chicago

CHICAGO, Jan. 6.

The feature of the past week's market is the closing of numerous rail contracts by Western lines. Counting the Burlington purchase mentioned a week ago, approximately 250,000 tons of rails have been definitely ordered and other contracts which will account for 100,000 to 150,000 tons more have been tentatively placed pending the settlement of final arrangements for the return of the carriers to private hands. Large orders for track fastenings are also being given, the Rock Island having purchased 15,000 tons of tie plates alone. In other finished products there have been no unusual developments, the demand still being very pressing and in excess of the production of the mills. The pig-iron market has not yet fully recovered from the lull of the holiday season, but inquiries for last half delivery are commencing to appear. So far only one sale for that delivery is known to have been made, that being 2500 tons of No. 2 Northern foundry, which sold at $40, furnace. Scrap is active and advancing. Five hundred tons of No. 1 cast was recently sold at $38 net, the equivalent of $42.56 per gross ton, which is above the ruling quotation on Northern No. 2 foundry iron. About 50,000 tons of heavy melting and shoveling steel was bought by a local interest at $25 and $24.50 per gross ton respectively.

Pig Iron.—Although the market has not yet fully recovered from the lull of the holiday season, consumers are taking a steadily increasing interest in iron. The leading Northern producer is gradually gaining in its output and is having less trouble securing equipment for shipments than in previous recent weeks. Some of the important outside producers are still out of the market, but one large Southern maker of foundry has taken a few orders for first half delivery on the basis of $38 base, Birmingham, these tonnages being 200, 500 and 1000 respectively. Another Southern producer is still offering a limited amount of spot foundry at $36 base, Birmingham. Two Virginia interests are selling for first quarter and first half respectively at $40 base, furnace, subject to $4.90 freight to Chicago. One of these makers recently sold 650 tons on this basis, 500 of which was 1.75 to 2.25 per cent silicon, foundry, and the remainder 2.25 to 2.75 per cent. The Chicago, Milwaukee & St. Paul, which was in the market for 700 tons of charcoal, has placed at least part of this tonnage. Current inquiries are for the time being rather small, one of the largest calling for 1000 tons of malleable. As yet, little second half business has been done, an exception being a sale of 2500 tons of No. 2 Northern foundry at $40, furnace. Sellers estimate that foundries still have about one-third of their first half requirements to buy. The silvery furnace of the Jackson Iron & Steel Co., Jackson, Ohio, blew in to-day.

The following quotations are for iron delivered at consumer's yards except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnace and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, average silicon 1.50, f.o.b. furnace, average freight to Chicago, $2.50 (other grades subject to usual differentials)	$45.00
Northern coke No. 1, sil. 2.25 to 2.75	42.25
Northern coke foundry, No. 2 silicon, 1.75 to 2.25	40.00
Northern high phophorus foundry	40.00
Southern coke, No. 1 foundry and No. 1 soft, silicon, 2.75 to 3.25	$43.70 to 45.70
Southern coke, No. 2 foundry, silicon, 2.25 to 2.75	42.35 to 44.35
Southern foundry, silicon 1.75 to 2.25	41.00 to 43.00
Malleable, not over 2.25 silicon	40.50
Basic	39.00
Low phosphorus (copper free)	45.00
Silvery, 7 per cent	$49.15 to 51.80

Ferroalloys.—Ferromanganese has advanced to $140, delivered, for 76 to 80 per cent material. Domestic makers have little or no material to offer for first half delivery, but one producer is definitely known to have opened its books for last half. Ferrosilicon 50 per cent is available at $80, delivered. Spiegeleisen is somewhat stronger, being offered at from $40 to $45, furnace.

We quote 80 per cent ferromanganese at $140 delivered; 50 per cent ferrosilicon at $80 delivered; spiegeleisen, 18 to 22 per cent, $40 to $45 furnace.

Plates.—The leading interest is still able to accommodate old customers who want small lots of ordinary quality which will fit into existing rolling schedules. The company is not, however, accepting specifications for second quarter shipment except, of course, on contracts. The foremost independent has no tonnage to sell at present, and other mills are unable to meet the demand. There is a particularly marked scarcity of 3/16-in. plates, which is probably a result of the substitution of this size for heavy sheets. From a production standpoint the mills have been hampered by the unusually heavy demand for high quality material. To operate economically a maker should have bookings in the proportion of about 200 tons of ordinary quality

plates to 100 tons of high quality to take care of the off-heats. An inquiry for 3000 refrigerator cars to be built for the Union Pacific involves about 21,000 tons of plates, shapes and bars and 4000 tons of axles. The New York Central wants 15,000 tons of steel for the reconstruction of 3000 freight cars. An exporter is in the market for 4500 tons, principally plates, for the construction of oil storage tanks in a European country.

The mill quotation is 2.65c. Pittsburgh, the freight to Chicago being 27c. per 100 lb. Jobbers quote 3.67c. for plates out of stock.

Structural Material.—As the result of improved operation of its 28-in. mill, the foremost independent is in a position to add to its bookings a comparatively small tonnage of beams, channels and angles in large sizes for first half delivery. The leading interest is also able to take additional small lots of heavy shapes to match up with present rolling schedules. In smaller sizes neither the local producers nor outside mills have much to offer. Through the efforts of the leading mills the base price of March 21 still obtains, but fabricators complain that all extra charges are being strictly enforced, whereas some months ago many of them were waived. The American Bridge Co. will fabricate 4000 tons for a foundry to be built for Fairbanks, Morse & Co. at Beloit, Wis. The Toledo Bridge & Crane Co. will supply 1500 tons for a foundry to be erected for Campbell, Wyant & Cannon, Muskegon, Mich. This building is the first of eight plant units projected, including a blast furnace. Other recent fabricating awards include:

Foundry for Shaw Crane Works, Muskegon, Mich., 1000 tons, to McClintic-Marshall Co.

Williams, White & Co., foundry, Moline, Ill., 1200 tons, to McClintic-Marshall Co.

Ocean Boulevard bridge, Los Angeles, 600 tons, to McClintic-Marshall Co.

Wisconsin State Highway Commission, stationary span across Wisconsin River, Prairie du Sac, Wisconsin, 550 tons, to Milwaukee Bridge Co.

Hubbard Steel Foundry Co., machine shop and foundry additions, East Chicago, Ind., 300 tons, to Northwestern Bridge & Iron Co.

Pending inquiries include:

Old Colony Life Insurance Co. Building, Quincy Street, near Wells Street, Chicago, 900 tons.

Nash Motors Co., addition to machine shop and assembly plant, Milwaukee, 300 tons.

The Truscon Steel Co., Milwaukee office, has taken the following contracts involving reinforcing bars: Kohler Co., Kohler, Wis., 400 tons, for plant and office additions and cupola building; West Bend Aluminum Co., West Bend, Wis., factory addition, 300 tons; George Ziegler Co., Milwaukee, confectionery plant, 235 tons.

The mill quotation is 2.45c. Pittsburgh, which takes a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote $3.47 for materials out of warehouse.

Rails and Track Supplies.—Including the Burlington purchase mentioned a week ago, orders for 243,700 tons of rails have been definitely placed by Western railroads. The Illinois Steel Co. will roll 40,000 tons each for the Rock Island and the Union Pacific, 30,000 tons for the Illinois Central, 15,000 tons for the Great Northern, 12,000 tons for the Soo line, 10,000 tons for the Chicago & Alton, 6000 tons for the Monon, 5000 tons for the Minneapolis & St. Louis, 3500 tons for the Chicago Junction, and 2200 tons for the United Railroads (electric), St. Louis. The Lackawanna Steel Co. will supply 15,000 tons to the Great Northern and 10,000 tons to the Northern Pacific. The Santa Fe will close in about 10 days for 70,000 tons, two-thirds of which will be rolled by the Colorado Fuel & Iron Co. and one-third by the Illinois Steel Co. The Chicago, Milwaukee & St. Paul has reserved space for 20,000 tons, but it is uncertain as to when the contract will be closed. Large orders for track fastenings are also being placed. The Rock Island has bought 15,000 tons of tie plates alone. The Santa Fe's program includes 40,000 kegs of spikes, 3000 of which have already been placed, 6500 kegs of bolts and 6500 tons of tie plates. Inquiry for light rails continues to come from Japan, and coal mines in this country are buying rather generally for their current requirements.

The Railroad Administration has ordered 2500 tons of rails for the Kansas City Terminal Railroad. The following lines in the St. Louis district have tentatively ordered the ensuing tonnages: Missouri, Kansas & Texas, 20,000; Wabash, 15,000; Missouri Pacific, 9500; Kansas City Southern, 6000. Most of this tonnage was placed with the local mill. We quote:

Standard railroad spikes, 3.35c. Pittsburgh. Track bolts with square nuts, 4.35c. Pittsburgh. Steel tie plates and iron angle bars, 2.75c. Pittsburgh and Chicago; tie plates, iron, 3.25c. f.o.b. makers' mills. Light rails, 2.45c. f.o.b. makers' mills, with usual extras.

Cast-iron Pipe.—Detroit has rejected bids on 9200 tons of pipe on which it took figures a week ago, and will readvertise. Havre, Mont., received tenders on 1100 tons yesterday and Elyria, Ohio, will take bids on 300 tons to-day.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., $69.80; 6-in. and above, $66.80; class A and gas pipe, $2 extra.

Bolts and Nuts.—A shortage of raw material continues to impede manufacturers in their efforts to gain on the demand. Jobbers have advanced structural and boiler rivets. For mill prices see finished iron and steel, Pittsburgh, page 163.

Jobbers quote: Structural rivets, 4.97c.; boiler rivets, 5.07c.; machine bolts up to ⅞ x 4 in., 35 and 5 per cent off; larger sizes, 25 and 5 off; carriage bolts up to ⅞ x 6 in., 30 off; larger sizes, 20 off; hot pressed nuts, square tapped and hexagon tapped, $1.45 off; coach or lag screws, gimlet points, square heads, 40 and 5 per cent off. Quantity extras are unchanged.

Old Material.—An important steel interest has purchased from 40,000 to 50,000 tons of heavy melting and shoveling steel at $25 and $24.50, respectively. Foundry grades are also active, numerous round lots having been sold. A sale of 500 tons of cast scrap was made last week at $38 per net ton, the equivalent of $42.56 gross. It will be noted that this material sold higher than the current quotation on No. 2 foundry iron. Considerable tonnages of re-rolling rails have been purchased of late and low phosphorus melting steel is active after a long quiescent period. The Pennsylvania Lines West has issued a list of 2000 tons and the Grand Trunk Lines are advertising a like tonnage. The Chicago & Eastern Illinois offers 600 tons.

We quote delivery in buyer's yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$28.00 to $29.00
Relaying rails	40.00 to 50.00
Car wheels	34.50 to 35.50
Steel rails, rerolling	33.00 to 34.00
Steel rails, less than 3 ft.	28.00 to 28.50
Heavy melting steel	24.00 to 25.00
Frogs, switches and guards, cut apart	24.00 to 25.00
Shoveling steel	24.00 to 24.50
Low phos. heavy melting steel	27.00 to 28.00
Per Net Ton	
Iron angles and splice bars	$28.50 to $29.50
Steel angle bars	24.00 to 24.50
Iron arch bars and transoms	29.25 to 30.25
Iron car axles	34.00 to 35.00
Steel car axles	31.00 to 31.50
No. 1 busheling	20.50 to 21.50
No. 2 busheling	14.50 to 15.00
Cut forge	22.50 to 23.00
Pipes and flues	18.50 to 19.00
No. 1 railroad wrought	25.00 to 26.00
No. 2 railroad wrought	22.50 to 23.00
Steel knuckles and couplers	24.50 to 25.00
Coil springs	26.50 to 27.00
No. 1 cast	35.50 to 36.00
Boiler punchings	26.50 to 27.00
Locomotive tires, smooth	24.50 to 25.00
Machine-shop turnings	11.00 to 11.50
Cast borings	13.00 to 14.00
Stove plate	29.00 to 30.00
Grate bars	29.00 to 30.00
Brake shoes	24.50 to 25.50
Railroad malleable	28.00 to 29.00
Agricultural malleable	28.00 to 29.00
Country mixed	18.50 to 19.50

Philadelphia

PHILADELPHIA, Jan. 6.

A low rate of steel production continues to make worse the conditions of scarcity which have existed for some weeks. With orders on their books sufficient for 100 per cent production for some months to come, the steel plants which were affected by the strike are not regaining ground as rapidly as hoped for. Despite the unwillingness of steel companies to book business, orders are piling up faster than production is increasing. A western Pennsylvania plant, which had 14,000 employees before the strike, has 12,000 men now at work, but is getting only 50 per cent output, while a

Youngstown plant, with 90 per cent of its men back at work, has not yet exceeded a 60 per cent rate of production because of general disorganization. Of the Eastern companies, Bethlehem is perhaps in the most favorable position as to output. Its production of pig iron is about 75 per cent, and some of its finishing departments are running practically full, the outstanding exception being the rail mills, which are idle. The Lukens Steel Co. is putting on more open-hearth furnaces and expects to effect a substantial gain in plate tonnage as its coal supply is improving. The plate mills of the Midvale company at Coatesville are running almost 100 per cent, but the plant has been put back from three 8-hr. turns to two 12-hr. turns on account of scarcity of common labor. Time and a half for over 8 hr. is paid.

The steel companies affected by the strike are taking very little business. The Midvale Steel & Ordnance Co. estimates its loss of tonnage at Johnstown, owing to the strike, at 350,000 tons for the fourth quarter, and it will be some months before this can be made up. Very little steel business is being taken for first quarter, but some orders are being booked, under pressure from consumers, with delivery at mill convenience.

Steel companies are getting word that the steel shortage is now beginning to affect seriously the production of automobiles. Some of the automobile plants, which were working 100 per cent during the strike, have used up a good part of their steel stocks and have now been forced to shut down some of their departments. It is stated that output of automobiles is likely to be considerably curtailed over the next few months at least.

Pig Iron.—A deal is pending whereby an Eastern plate manufacturer may trade 20,000 tons of ship plates to a steel company for about an equal tonnage of basic pig iron. The plates are wanted by the steel company for an affiliated shipbuilding interest. If the deal goes through it will probably be at around $40 for basic iron. Sales of low phosphorus iron have been made the past week at $48, furnace, an advance of $2 a ton over last reported sales. Copper-bearing iron is still quoted by one maker at $40, though $41 has been paid to another maker. The foundry iron market shows a little activity in small tonnages for first quarter delivery. Not much is being done for later delivery, though one Eastern furnace is reported to have sold a considerable tonnage for second and third quarters. For nearby delivery the minimum now appears to be $42, furnace, for 1.75 to 2.25 per cent silicon iron and $43.25, furnace, for 2.25 to 2.75 per cent silicon iron. Sales have been made at these prices. In one case a sale was made at $42.25, furnace, with a freight rate of $2.80 added. Malleable is scarce and higher.

The following quotations are for iron delivered in consumers' yards in Philadelphia or vicinity, except those for low phosphorus iron, which are f.o.b. furnace:

Eastern Penn., No. 2X, 2.25 to 2.75 sil.	$44.35 to $45.05
Eastern Penn., No. 2 plain, 1.75 to 2.25 sil.	43.10 to 43.80
Virginia No. 2 X, 2.25 to 2.75 sil.	45.35
Virginia No. 2 plain, 1.75 to 2.25 sil.	44.10
Basic deliv. Easton, Pa.	39.00 to 40.00
Gray forge	39.40
Standard low phosphorus (f.o.b. furnace)	48.00
Malleable	42.00 to 43.00
Copper bearing low phosphorus (f.o.b. furnace)	40.00 to 41.00

Ferroalloys.—Domestic makers have advanced their price to $140, delivered, for 76 to 80 per cent grade, while British agents, who have very little to sell, and that only for deferred delivery, are asking $130, seaboard. The leading domestic maker is sold up for first half. One Eastern maker of spiegeleisen is asking $45, furnace. The market is not active.

Plates.—The Bethlehem Shipbuilding Corporation is in the market for a total of about 20,000 tons of plates. One inquiry for 14,000 tons was reported two weeks ago, and there has been a subsequent inquiry for 6000 tons. The demand for plates is considerably in excess of the available supply, particularly for delivery in first quarter. Some mills are out of the market entirely. The lowest price heard, except that of the leading interest, is quoted by a Buffalo mill to its regular customers for very small tonnages, it being 2.75c., Pittsburgh. Another mill, at Pittsburgh, is quoting 2.85c., but is not taking any business. The Eastern market is from 3.25c. to 3.50c., Pittsburgh, three Eastern producers having advanced on Jan. 1 to the latter price. On universal plates and some sheared plates, 3.25c. can be done. The plate market is so strong that the mills are selecting only such tonnages from regular customers as cannot be avoided, and in some cases no definite promises of delivery are given. The Lukens Steel Co. is quoting four weeks on universal and three months on sheared plates. We quote sheared plates, ¼ in. and heavier, at 3.495c. to 3.745c., Philadelphia.

Bars.—Steel bars are extremely scarce. One mill which is out of the market has had numerous offers of tonnage at its own price. On some lots 3.50c. to 4c., Pittsburgh, has been done. It is impossible to quote a market price, as so little business is being taken. Bar iron is being sold at 3.50c., Pittsburgh, though one small Philadelphia mill has quoted 2.75c. and 3c., Pittsburgh. There is a good demand for alloy steel bars, one inquiry to-day calling for 1700 tons of chrome nickel steel.

Old Material.—The Worth Steel Co. purchased about 5000 tons of No. 1 heavy melting steel at $23.50, delivered, and the American Bridge Co. is reported to have paid $24 or higher on small lots from shipyards and other producers of heavy scrap. The whole scrap market has moved to a higher level of prices, with further advances predicted by the trade. Stove plate is in demand for steel plants and rolling mills and has sold at $24 to $25. Car wheels have brought $33 to $34, No. 1 railroad wrought $32 to $33. Steel car axles for export are in good demand and have been sold at $39 to $40, f.a.s. New York. We quote prices for delivery to consumers works in eastern Pennsylvania as follows:

No. 1 heavy melting steel	$23.50 to $24.00
Steel rails rerolling	32.00 to 34.00
No. 1 low phosphorus, heavy, 0.04 and under	27.00 to 28.00
Car wheels	33.00 to 34.00
No. 1 railroad wrought	32.00 to 33.00
No. 1 yard wrought	26.00 to 27.00
No. 1 forge fire	18.50 to 19.00
Bundled skeleton	18.50 to 19.00
No. 1 busheling	20.00 to 21.00
No. 2 busheling	17.50 to 18.50
Turnings (short shoveling grade for blast furnace use)	18.00 to 18.50
Mixed borings and turnings (for blast furnace use)	17.00 to 17.50
Machine-shop turnings (for rolling mill and steel works use)	18.00 to 18.50
Heavy axle turnings (or equivalent)	20.00 to 21.00
Cast borings (for rolling mills)	22.00 to 23.00
Cast borings (for chemical plant use)	24.50 to 25.00
No. 1 cast	33.00 to 34.00
Railroad grate bars	26.00 to 27.00
Stove plate	24.00 to 25.00
Railroad malleable	27.00 to 28.00
Wrought iron and soft steel pipes and tubes (new specifications)	22.50 to 23.50
Iron car axles	45.00 to 46.00
Steel car axles (f.a.s. New York for export)	39.00 to 40.00

Birmingham

BIRMINGHAM, ALA., Jan. 6.

Pig Iron.—Birmingham pig iron was firm at $37.50 to $38 when the new year came in, stocks negligible, output tending to an increase and furnaces well sold through the first quarter, but interests declining large bookings for the second quarter. Lots of 200 and 300 tons for strictly Southern, Middle Western and Virginia delivery sold at $38 following similar lots sold at $37.50. At the close of the first week one Birmingham interest had quoted $40 on a small lot, but acceptance had not been received. Another interest had nothing under $38. There is little doubt that spot iron will change hands, in some instances, at least, at $40 in the immediate future. Makers express themselves as opposed to further advances, but all yield as one breaks away to the next higher level. The consumer is not displaying nervousness, but inquiry for second half shows the character of the demand and value attached to present price levels. The Jenifer stack will resume this week after a short shutdown. The Alabama Co. has begun

taking by-product coke from the Semet-Solvay plant. We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

Foundry, silicon 1.75 to 2.25	$37.50 to $38.00
Basic	36.50 to 37.00

Coal and Coke.—Alabama mines are operating about as in January, 1919. Coke remains at $9 and $9.50, with foundry coke in better supply. Alabama's year's coal output for 1919 is around 15,000,000 tons, compared with 19,521,000 in 1918 and 20,413,000 in 1917.

Old Material.—The scrap market is very strong, with cast the leading item, but inquiry active for steel. Wrought is the only lagging feature. Stocks on yards are beginning to run low and premiums are frequently secured over the war scale. We quote per gross ton, f.o.b. Birmingham district yards, prices to consumers as follows:

Steel rails	$21.00 to $22.50
No. 1 heavy steel	20.00 to 21.00
Cast iron borings	14.00 to 15.00
Machine-shop turnings	14.00 to 15.00
Stove plate	24.00 to 25.00
No. 1 cast	26.50 to 27.50
Car wheels	26.50 to 27.50
Tramcar wheels	25.50 to 26.50
Steel axles	29.00 to 30.00
No. 1 wrought	24.00 to 25.00

Buffalo

BUFFALO, Jan. 6.

Pig Iron.—All but one pig iron producing interest of the district is declining to quote into second half of the year. The interest that is quoting for second half is asking the same schedule of prices for that period as is asked by other producers for first half delivery, which is $40 for 1.75 to 2.25 silicon; $41.25 for 2.25 to 2.75 and $43 for 2.75 to 3.25. It has taken considerable tonnage for last half, having booked something over 10,000 tons foundry grades during the past week and has a large aggregate of inquiry still pending. This interest, which has had a larger tonnage of first half iron to offer for some time past than any other producer of the district, is now pretty well sold up for that period and has advanced its prices for the remainder of its capacity to $42, $43.25 and $45 respectively for the foundry grades above mentioned. It is holding as much tonnage as possible for regular customers whom it feels it is under obligations to care for. It is also holding a proportion of second-half capacity for such customers, although general inquiry is coming in rapidly and it could close up considerable tonnages quickly, should it desire to do so. It has been offered for spot delivery higher prices than its advanced schedule for first half. Other producers are sold up so closely for first half that it is with difficulty they can spare carload lots to help out old customers' emergency needs. We quote as follows for first half delivery, f.o.b. furnace, Buffalo:

No. 1 foundry, 2.75 to 3.25 silicon	$43.00 to $45.00
No. 2X, 2.25 to 2.75 silicon	41.25 to 43.25
No. 2 plain foundry, 1.75 to 2.25 sil.	40.00 to 42.00
Malleable, silicon not over 2.25	41.25
Basic	39.00
Lake Superior charcoal, regular grades, f.o.b. Buffalo	42.60

Finished Iron and Steel.—Demand in all lines exceeds the supply, and mills and selling agencies are obliged to turn down more inquiry than they can accept, confining sales to regular customers and limiting them to a proportionate amount of tonnages they are able to fill.

Old Material.—The market is exceedingly strong, with a great volume of inquiry, there being a good demand for every commodity on the list and the outlook indicates a material advance in prices within a very short time. As high as $26 is being paid for heavy melting steel outside the district. Cast scrap is scarce, although the demand is not as heavy as for some other grades of scrap. There is a great scarcity of cars for loading and also a shortage of laborers. Stocks in dealers' yards are being held to await the expected advance in prices and they cannot be augmented rapidly, as many plants producing scrap were partially shut down during the holidays.

We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel, regular grades	$23.00 to $23.50
Low phosphorus, 0.04 and under	27.00 to 28.00
No. 1 railroad wrought	28.00 to 29.00
No. 1 machinery cast	31.00 to 32.00
Iron axles	35.00
Steel axles	35.00
Car wheels	32.00 to 33.00
Railroad malleable	25.00 to 26.00
Machine-shop turnings	15.00 to 15.50
Heavy axle turnings	20.00 to 20.50
Clean cast borings	20.00 to 21.00
Iron rails	28.00 to 29.00
Locomotive grate bars	24.00 to 25.00
Stove plate	24.00 to 25.00
Wrought pipe	19.00 to 20.00
No. 1 busheling	20.00 to 21.00
Bundled sheet stamping	17.00 to 18.00

St. Louis

ST. LOUIS, Jan. 5.

Pig Iron.—The demand for pig iron continues heavy from all sources, both large and small consumers seeming anxious to get all the iron possible, but the transactions are not individually large nor extreme in the aggregate, because of the unwillingness of the furnaces to commit themselves on future deliveries at the present time. The best figures obtainable at this point are for No. 2 Southern $45 Birmingham, with Ohio iron at $40.25 Ironton and the local furnace at $42 base. Lake Superior charcoal is up $1.50 per ton, and the situation generally is very strong, with expectations of still further advances. Big consumers have no large inquiries in the market, but they are all buying from day to day as opportunity offers.

Old Material.—Scrap dealers speculating among themselves are advancing quotations but consumers are not in the market on account of inventory period and yard congestion, especially rolling and steel mill interests. Dealers' prices, f.o.b. customers' works, St. Louis:

Old iron rails	$28.50 to $29.00
Old steel rails, rerolling	32.50 to 33.00
Old steel rails, less than 3 ft.	26.50 to 27.00
Relaying rails, standard sections, subject to inspection	38.00 to 45.00
Old car wheels	31.00 to 32.00
No. 1 railroad heavy melting steel	25.00 to 25.50
Heavy shoveling steel	22.50 to 23.00
Ordinary shoveling steel	21.50 to 22.00
Frogs, switches and guards, cut apart	26.00 to 26.50
Ordinary bundled sheets	14.25 to 14.75
Heavy axle and tire turnings	18.00 to 18.50
Per Net Ton	
Iron angle bars	25.50 to 26.00
Steel angle bars	23.00 to 23.50
Iron car axles	35.50 to 36.00
Steel car axles	34.00 to 34.50
Wrought arch bars and transoms	29.00 to 29.50
No. 1 railroad wrought	24.50 to 25.00
No. 2 railroad wrought	23.50 to 24.00
Railroad springs	23.00 to 23.50
Steel couplers and knuckles	23.00 to 23.50
Locomotive tires, 42 in. and over, smooth inside	23.00 to 23.50
No. 1 dealers' forge	21.50 to 22.00
Cast iron borings	12.00 to 12.50
No. 1 busheling	22.00 to 22.50
No. 1 boiler, cut to sheets and rings	18.00 to 18.50
No. 1 railroad cast	31.00 to 31.50
Stove plate and light cast	28.00 to 28.50
Railroad malleable	24.50 to 25.00
Agricultural malleable	24.50 to 25.00
Pipes and flues	19.00 to 19.50
Heavy railroad sheet and tank	17.50 to 18.00
Railroad grate bars	26.50 to 27.50
Machine-shop turnings	13.00 to 13.50
Country mixed	20.00 to 20.50
Uncut railroad mixed	21.50 to 22.00
Horseshoes	23.00 to 23.50

New York

NEW YORK, Jan. 6.

Pig Iron.—The upward trend in the market which seemed to be arrested last week has again prevailed, and prices are higher. On eastern Pennsylvania iron the usual quotations now are based on $42 furnace for No. 2 plain and $43.25 for No. 2X. On Virginia iron, with but limited tonnage available, $40 furnace is asked for No. 2 plain. The demand for foundry iron is fairly active and some large foundries in New England are reporting that the stocks on hand are extremely limited, so that they will have to receive additional deliveries very soon. One firm sold 10,000 tons of foundry iron, mostly 2.25 to 2.75 silicon, for first half. The General Electric Co. has bought upward of 10,000 tons of foundry iron for its various plants for the second quarter, and it is believed has placed the business at a basis of between $38 and $39, furnace. Its inquiry included also 2700 tons of malleable iron for the Erie, Pa., plant, and

at this writing it has not covered for 600 tons of high manganese iron. The demand for basic is not lively and the price is somewhat uncertain, but would probably be about $40, furnace, if any demand were to be established. Alabama iron at $38, furnace, can be delivered in New York at $45.70, which is not very far from the price of Northern iron, but no sales have yet been made. Inquiry for iron for export still continues to come in, but none seems to be available for that purpose. For delivery in New York for this year we quote as follows:

No. 1 foundry, silicon 2.75 to 3.25	$45.05 to $46.00
No. 2X, silicon 2.25 to 2.75	44.05 to 45.05
No. 2 plain, silicon 1.75 to 2.25	42.80 to 43.80
No. 2X, Virginia, silicon 2.25 to 2.75	44.40

Ferroalloys.—A pronounced scarcity of ferromanganese exists, with little relief in sight, and prices continue to advance. Domestic consumers are out of the market for the first half and are asking $140, delivered, for the second half, no orders to be booked except for delivery throughout the six months. A comparatively small amount of British alloy is available for second quarter delivery at $140, seaboard, some of which has already been sold, with the total amount available 1000 tons. So far as can be learned all other British producers are out of the market for the first half and are not prepared to make any offerings for the second half. A carload lot of domestic alloy for spot delivery has been sold in the last week at $150, delivered. The trade confidently predicts higher prices and cannot see much likelihood of an increase in domestic production because of the scarcity of ores. The output of American furnaces in December was 11,210 tons, which compares with 15,249 tons per month to Oct. 1, 1919, according to the blast furnace reports of THE IRON AGE. The spiegeleisen market is quiet but strong and higher at $45 to $50, furnace, an increase of $5 in the week. A considerable amount is still under negotiation for export. The December output was 4508 tons. Ferrosilicon, 50 per cent, is quiet but strong at $80 to $90 per ton, delivered.

Cast Iron Pipe.—A second raise in price has been made within the month, the latter being an increase of $5 on all sizes, effective Jan. 2, which means a total raise of $9 a ton since the first of December. The corresponding increase of the cost of raw materials and the increasing demands of labor are the reasons given for the action taken. Manufacturers are having difficulty in making prompt deliveries because of the large mass of orders and the scarcity of skilled help. One maker states he could use 100 more molders. We now quote 6-in. and heavier at $67.30, New York; 4-in., $70.30, with $2 additional for Class A and gas pipe.

Finished Iron and Steel.—The market is characterized chiefly by unwillingness of many mills to take on further tonnage. It is difficult to estimate just how much business might be placed if the mills were in a position to promise fairly early deliveries. At the moment there is not such a large amount of business being offered as might be expected under existing conditions of scarcity. Perhaps this is due to the fact that consumers have pretty thoroughly canvassed the various sources of supply and realize the futility of trying to place orders for first quarter delivery, particularly for such forms of steel as sheets, bars, wire products and pipe. Several of the plate mills are out of the market, except on universals. The prevailing price on such plate tonnage as is being placed is about 3c., Pittsburgh, though 2.85c. to 2.90c. was done on a tonnage placed by a large consumer. Two Eastern makers have raised their base price to 3.50c., Pittsburgh. Somewhat active negotiations are in progress in the matter of steel rails. Apparently the different railroad companies are getting sanction from the Railroad Administration to contract for January and February necessities in the matter of mill space, the rail mills thus securing indirectly assurance that the money will be forthcoming. The bulk of the negotiation is for the Western rail mills, only a limited capacity being obtainable in the East for the immediate future. A Staten Island shipyard will build three and possibly six ships for the Southern Pacific and has bought some of the steel plates at 3c. For a 4-ft. pipe line for Bayonne 4400 tons of plates are required. One of the large interests had to decline one tender of 18,000 tons of plates. For marine boilers 400 tons were bought at 3.50c., Pittsburgh, base. The structural market continues fairly active as to inquiries, though lettings the past week have been mostly small buildings. The American Bridge Co. has taken a 200-ton warehouse for A. V. Manning & Sons; a 250-ton outfitting shop for the Federal Shipbuilding Co.; three buildings totalling 225 tons for the Power Specialty Co., Danville, N. Y. The Levering & Garrigues Co. has received the contract for the American Industrial Bank & Trust Co.'s building, Hartford, Conn., 1500 tons. The Snare & Triest Co. is low bidder on two piersheds in New York, totalling 600 tons. Announcement of the return of the railroads to their owners on March 1 has not been followed as yet by much inquiry for equipment. Prices on a great many cars were quoted a few months ago, when it was expected the roads would go back Jan. 1. The Union Pacific Railroad is in the market for 3000 refrigerator cars with steel underframes. Steel export companies are taking only such business as cannot be avoided. One company has booked 4000 tons of bars, 2000 tons of which will go to Japan. The prices paid were 3.25c., Pittsburgh, on bars over ½ in. and 4c., base, Pittsburgh, on sizes under ½ in.

We quote for mill shipment, New York, as follows: Soft steel bars, 2.62c. to 3.27c.; shapes, 2.72c. to 2.82c.; plates, 2.92c. to 3.77c., the minimum prices being for indefinite delivery and the higher prices for the first quarter; bar iron, flats, wider than 6 in., 4.07c.; ¾ and 7/16 in. round and square, 4.47c.; light rounds, squares and flats, 4.77c., and other sizes, 3.77c.

Old Material.—The sensation of the week in this line is the rise of cast scrap, which averages about $3 higher than seven days ago. Sales have been made of No. 1 machinery cast as high as $41, delivered in the East. Considerable inquiry comes from the Middle West and some scrap is being shipped there. Although much of the existing optimism among dealers is due to their hopes for the future, a great share of it is due to the large volume of sales being transacted in the present. There is a marked demand for old carwheels, and iron and steel axles. Prices which brokers and dealers are paying, New York, per gross ton, follow:

Heavy melting steel	$19.50 to $20.50
Rerolling rails	30.00 to 31.00
Relaying rails, nominal	47.00 to 48.00
Steel car axles	33.00 to 34.00
Iron car axles	42.00 to 43.00
No. 1 railroad wrought	29.00 to 29.50
Wrought iron track	21.00 to 22.00
Forge fire	16.50 to 17.00
No. 1 yard wrought, long	23.00 to 24.00
Light iron	7.00 to 8.00
Cast borings (clean)	17.00 to 17.50
Machine-shop turnings	15.00 to 15.50
Mixed borings and turnings	14.50 to 15.00
Iron and steel pipe (1 in. min. diam., not under 2 ft. long)	19.00 to 19.50
Stove plate	22.00 to 23.00
Locomotive grate bars	25.00 to 26.00
Malleable cast (railroad)	24.00 to 24.50
Old carwheels	33.00 to 34.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton:

No. 1 machinery cast	$35.00 to $36.00
No. 1 heavy cast (columns, building materials, etc.) cupola size	34.00 to 35.00
No. 1 heavy cast, not cupola size	25.00 to 26.00
No. 2 cast (radiators, cast boilers, etc.)	25.00 to 26.00

Cincinnati

CINCINNATI, Jan. 6.

Pig Iron.—Conditions in the pig iron market have been somewhat easier the past week, few sales being made and these only for small lots of off-grade iron. Standard foundry iron for prompt shipment has practically disappeared from the market and first quarter is to be had in only very limited quantities. Inquiry during the week has been light, but it is expected that it will become heavier in the near future as consumers come into the market for second half needs. Southern Ohio furnaces that usually supply this territory have disposed of practically all of their output for the first half, but it is understood that Southern furnaces have still some to dispose of for second quarter. The price situation is very strong, one Southern producer now quoting $40 furnace for second quarter, while an interest in Southern Ohio is holding output at $40 and is reported to have already disposed of several small lots at that figure. A small lot of Virginia iron was sold in this territory on a basis of $39 furnace, but this

interest has now advanced its price to $40. An Indiana foundry was in the market for No. 2 foundry last week, but could secure only 200 tons of silicon, 2.25 to 5, for which it paid $42.60 delivered. Some Southern iron, silicon 2.25 to 2.75, but high in sulphur, was disposed of at $38, Birmingham, for prompt shipment. No sales of basic or malleable are reported and quotations are nominal.

Based on freight rates of $3.60 from Birmingham and $1.80 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, silicon 1.75 to 2.25 base price)	$40.60 to $41.60
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	41.00
Ohio silvery, 8 per cent silicon	51.80
Southern Ohio coke, silicon 1.75 to 2.25 (No. 2)	39.55 to 40.55
Basic, Northern	36.05
Malleable	40.05

Coke.—The coke situation is showing improvement and no furnaces have been banked on this account.

Finished Material.—Deliveries of finished products, with the exception of black and galvanized sheets, appear to be getting better, but are still far behind the demand. All jobbers here are completely out of sheets and see no prospects of securing any for an indefinite period. The last quotation received from jobbers was $7.40 for No. 28 galvanized. We quote from jobbers' stocks:

Steel bars, 3.58c.; structural shapes, 3.68c.; No. 10 blue annealed, 4.78c.; cold-rolled rounds, 5.25c.

Old Material.—The scrap market remains very firm. Dealers report a scarcity exists in practically all lines, but that this is now being relieved to a small extent. Prices have been advanced over last week's quotations, and predictions are freely made that they will go even higher. Stocks of foundries in this vicinity are very low at the present time, and it is expected that great activity will very shortly be witnessed. We quote:

Per Gross Ton	
Bundler sheet	$15.00 to $16.00
Old iron rails	26.00 to 27.00
Relaying rails, 50 lb. and up	42.00 to 43.00
Rerolling steel rails	27.00 to 28.00
Heavy melting steel	21.00 to 22.00
Steel rails for melting	22.00 to 23.00
Old car wheels	26.00 to 27.00
No. 1 railroad wrought	23.00 to 24.00
Per Net Ton	
Cast borings	$11.50 to $12.00
Steel turnings	11.00 to 11.50
Railroad cast	28.00 to 29.00
No. 1 machinery	31.00 to 32.00
Burnt scrap	17.00 to 18.00
Iron axles	28.50 to 29.00
Locomotive tires (smooth inside)	21.50 to 22.50
Pipes and flues	16.00 to 16.50
Malleable cast	20.50 to 21.00
Railroad tank and sheet	15.00 to 15.50

Cleveland

CLEVELAND, Jan. 6.

Iron Ore.—Approximately 100,000 tons of iron ore on docks has been resold during the past few days at a considerable advance over the price the same grade brought last season. The ore was high in phosphorus, a grade that is not ordinarily sold subject to the regular base price. It was owned by a steel company, but this consumer, because of delays due to the strike, found that it had more of the ore than it needed and turned it over to a selling agency, which found a ready market for it among furnaces making foundry pig iron. Sentiment has not yet crystallized on the advance in ore prices for the coming season, but the opinion is expressed that it should be at least 50c. a ton. Ore prices have not changed since October, 1918, the prices that prevailed last season being the price established by the Government in the month named. The reports of quite a few mining companies show that they operated at a loss during last year. We quote, f.o.b. lower Lake ports:

Old range Bessemer, $6.45; old range, non-Bessemer, $5.70; Mesaba Bessemer, $6.20; Mesaba non-Bessemer, $5.55.

Pig Iron.—Considerable inquiry for foundry iron for the last half came out during the week, but furnaces are declining to quote for that delivery. One of the principal reasons for their refusal is that they do not know yet what their ore will cost them. There is still an active demand for iron for the first half, particularly for foundry grades, but Cleveland sellers are well sold up to July 1, and only one is booking any additional orders. We note the sale of 5000 tons of off-basic iron to a consumer in the Cincinnati territory by a southern Ohio furnace, and the American Steel Foundries is inquiring for 10,000 to 15,000 tons of basic iron for the second quarter for its Sharon and Alliance plants. There are also foreign inquiries for 5000 tons of basic and 5000 tons of foundry. One seller is adhering to $38 for No. 2 foundry iron, believing that present prices are high enough. But some others are quoting $40, and we note a few small lot sales at $40. No standard Southern iron is being offered for early shipment, but some iron high in silicon and sulphur has been sold at a price equivalent to about $39 for No. 2. One producer is asking $40 for No. 2 for the second quarter. The McKinney Steel Co. has now all its Cleveland blast furnaces operating, having blown in the fourth stack last week. The stack of the United Furnace Co., Canton, Ohio, which has been out for relining, will be blown in this week. We quote, delivered Cleveland, as follows:

Basic	$35.40 to $36.40
Northern No. 2 foundry, silicon 1.75 to 2.25	$38.40 to 40.40
Southern foundry, silicon 2.25 to 2.75	43.45
Gray forge	37.40
Ohio silvery, silicon 8 per cent	52.40
Standard low phos., Valley furnace	$43.00 to 44.00

Finished Iron and Steel—The steel situation in respect to supply is growing worse and with many buyers price is a secondary consideration. However, few mills have anything to sell. The curtailment of production of alloy steels by Ohio mills because of the steel and coal strike has resulted in an acute shortage of this steel for the automobile trade and the Ford Motor Car Co. has come in the market for a heavy tonnage of alloy steel for this year's delivery. Plates are in heavy demand. A Cleveland mill is now taking plate orders at 3.25c., and an eastern mill has advanced its price to 3.50c. and has been offered 3.75c. for plates for prompt shipment. A leading sheet manufacturer has offered $56 per ton for 1000 tons or more of sheet bars for January delivery to a Cleveland mill that has no unsold tonnage. One Cleveland mill shut down several days this week because of a shortage of slabs. A local producer is quoting blue annealed sheets at 4.25c. or $14 a ton above regular prices, but apparently no other Ohio mills are making quotations on sheets. There is a heavy demand from fabricators for structural steel to replace stocks, but mills are able to supply only a portion of the material required. New structural contracts include 2000 tons for the Sheriff street market, Cleveland, taken by the King Bridge Co., and 950 tons for the Masonic Temple, Cleveland, taken by the National Iron Wire Co. An inquiry is pending for 1400 tons for the Film Exchange Building, Cleveland. The Clover Leaf railroad has placed 5000 tons of rails and 7500 tons are pending from the Nickel Plate Railroad, and 2500 tons from the Ann Arbor road.

Jobbers quote out of stock: Steel bars, 3.27c. to 3.52c.; plates, 3.57c. to 3.82c.; structural shapes, 3.37c. to 3.62c.; bands and hoops, 3.97c. to 4.27c.; No. 10 blue annealed sheets, 4.47c. to 4.72c.; No. 28 black sheets, 5.27c. to 5.52c.; No. 28 galvanized sheets, 6.62c. to 6.87c.

Old Material.—The market is more active than it has been for several weeks and very firm. Prices on most grades are higher, the advance being $2 and $4 a ton on foundry and some other grades of scrap and $3 on heavy melting steel, these two grades in particular being affected by the higher pig iron prices. The McKinney Steel Co. purchased about 15,000 tons of heavy melting steel scrap during the week at $24 to $24.50. We quote:

Heavy melting steel	$23.50 to $24.50
Steel rails, under 3 ft	27.50 to 28.50
Steel rails, rerolling	32.75 to 33.50
Iron rails	29.00 to 30.00
Iron car axles	39.00 to 40.00
Steel car axles	34.00 to 35.00
Low phosphorus melting scrap	25.50 to 26.50
Cast borings	16.50 to 17.00
Iron and steel turnings and drillings	14.00 to 15.00
Short turnings (for blast furnaces)	16.00 to 16.50
Compressed steel	19.50 to 20.00
No. 1 railroad wrought	25.00 to 26.00
Railroad malleable	29.50 to 30.50
Agricultural malleable	25.00 to 26.00
Steel axle turnings	18.00 to 19.00
Light bundled sheet scrap	16.00 to 16.50
No. 1 cast	33.50 to 34.50
No. 1 busheling	20.50 to 21.50
Drop forge flashings, 10 in. and under	21.00 to 21.50
Drop forge flashings, over 10 in.	18.50 to 19.00
Railroad grate bars	27.50 to 28.50
Stove plate	29.00 to 30.00

Boston

BOSTON, Jan. 6.

Pig Iron.—The local market began the new year more active than anticipated and prices are stronger. The past week's business was featured by sales of several thousand tons of eastern Pennsylvania iron for second half delivery. Some 5000 tons of such iron, silicon 2.25 to 2.75 were taken by Massachusetts consumers at $43.25 furnace, while one Rhode Island consumer bought 2000 tons silicon, 2.75 to 3.25, at $45 furnace, and a New Hampshire firm 300 tons for June and July delivery on the same furnace base. Business has not been confined to second half delivery, however. Considerably more than 1,000 tons of eastern Pennsylvania is reported sold by one house to Massachusetts and Rhode Island consumers, first quarter delivery, at $42 furnace, and a nearby foundry took a few cars of No. 2 plain for late January delivery on the same furnace base. Another house sold 600 tons eastern Pennsylvania, silicon 2.25 to 2.75, at $42 furnace, first quarter delivery, with a freight of $3.10, and a New England foundry sold two cars to a Massachusetts consumer at $45.10 delivered, through a local broker. No Buffalo iron has sold here since last reports, and prices continue purely nominal. The Virginia Iron & Coke Co. has again come into the market with a limited tonnage for first half delivery and possibly 2000 tons were sold during the past day or two. That company is quoting on the following furnace base: Silicon 1.75 to 2.25, $40; silicon 2.25 to 2.75, $41.25; silicon 2.75 to 3.25, $43; silicon 3.25 to 3.75, $45; silicon 3.75 to 4.25, $46; silicon 4.25 to 4.75, $47. Alabama No. 2 plain, silicon 1.75 to 2.25, is quoted at $36 to $38 furnace and No. 2, silicon 2.25 to 2.75, at $37.40 to $38.40 furnace. Owing to the fact that the new rail and water tariff has not been received in Boston, authentic New England delivered prices cannot be quoted.

Eastern Pa., No. 2X, sil. 2.25 to 2.75	$46.15
Eastern Pa., No. 2 plain, silicon 1.75 to 2.25	44.90
Buffalo, No. 2X, silicon 2.25 to 2.75	46.15
Buffalo, No. 2 plain, silicon 1.75 to 2.25	44.90
Virginia, No. 2X, silicon 2.25 to 2.75	$45.95 to 46.95
Virginia, No. 2 plain, silicon 1.75 to 2.25	44.70 to 45.70

Old Material.—With the increased demand for pig iron has come a decided improvement in the New England movement of old material. The buying of heavy melting steel has been especially good, one house alone reporting transactions involving upward of 12,000 tons during the past week. As a result of this buying, local dealers have advanced prices 50c. per ton, but some outside yards continue on the old basis. We quote:

No. 1 heavy melting steel	$17.50 to $18.50
No. 1 railroad wrought	25.50 to 26.50
No. 1 yard wrought	21.00 to 22.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	17.00 to 18.00
Machine-shop turnings	13.00 to 13.50
Cast iron borings	15.00 to 16.50
Heavy axle turnings	15.50 to 16.00
Blast furnace borings and turnings	12.50 to 13.00
Forge scrap	13.50 to 14.00
Bundled skeleton	13.50 to 14.50
Steel car axles	27.00 to 28.00
Car wheels	28.00 to 29.00
Machinery cast	32.00 to 33.00
No. 2 cast	29.00 to 30.00
Stove plates	21.00 to 22.00
Railroad malleable	20.00
Rerolling rails	27.00 to 28.00

STILL HIGHER BRITISH PRICES

Molders' Strike Provisionally Settled—Higher Railroad Rates and Coke Prices to Affect Pig Iron and Steel

(By Cable)

LONDON, ENGLAND, Jan. 5.

The molders' strike has been provisionally settled by an advance of 5s. in wages, and work is to be resumed by Jan. 19. Not much business is reported in the pig iron market pending a revision in prices to meet the advance in railroad rates and a probable rise in coke prices. Steel prices will be advanced but to what extent has not yet been settled.

The galvanized sheet market is strong, and in the tin plate market domestic booking has been very heavy, with consumers caught short in a strong market. Steel billets are quoted at £17 to £17 10s.; sheet bars at £17 to £18; galvanized sheets at £45 10s. and tin plates at 52s. 6d. to 54s.

Ferromanganese has sold for export at £30 ($114 per ton with the £1 at $3.80). Dorman, Long & Co. has purchased the Carlton Iron Co., one of the British producers of ferromanganese.

Cleveland pig iron prices have been advanced 15s., making No. 3 and inferior grades 175s. ($33.25 at $3.80 to the £1) for domestic delivery and 180s. ($34.20) for export and No. 1 pig iron 182s. 6d. ($34.67) for domestic delivery and 187s. 6d. ($35.62) for export. Prices for East Coast hematite are not yet official, but it is expected that they will be advanced 20s. to 220s. ($41.80) for domestic consumption and to 225s. ($42.75) for export.

The coal output for the week ended Dec. 20 was 4,910,000 gross tons as compared with 4,886,000 tons and 4,806,000 tons for the two weeks ended Dec. 13 and Dec. 6 respectively.

We quote per gross ton, except when otherwise stated, f.o.b. makers' works, with American equivalents figured at $3.80 for £1, as follows:

	£	s.	d.		£	s.	d.	
Ship plates	22	0	0	to	23	0	0	$83.60 to $87.40
Boiler plates	25	0	0	to	28	0	0	95.00 to 106.40
Tees	18	15	0	to	19	15	0	71.25 to 75.05
Channels	18	0	0	to	19	0	0	58.40 to 62.20
Beams	18	15	0	to	19	5	0	71.25 to 76.00
Round bars, ¾ to 3 in.	21	15	0	to	22	15	0	82.65 to 86.45
Rails, 60-lb. and up	17	10	0	to	18	0	0	66.50 to 68.40
Billets	17	0	0	to	17	10	0	64.60 to 66.50
Sheet bars	17	0	0	to	18	0	0	64.60 to 68.40
Steel hoops	25	15	0	to	26	0	0	97.85 to 98.80
Tin plates	0	52	6	to	0	54	0	9.88 to 10.26
Galv. sheets, 24 g.	45	10	0					172.90

EXPORTING BILLETS

Round Tonnage Said to Have Netted Good Profit—The Exchange Factor

A lot of 20,000 tons of billets was sold a few days ago on export account, and is said to have netted a profit of $12 per ton to the exporting agency. There are other instances of round profits on semi-finished steel and occasionally in a short period of time a given lot changes hands with a profit naturally in each transaction. Generally speaking, exporters are not attempting much business with Europe while the exchange situation remains at to-day's ratios.

For Japan one company has taken 2000 tons of bars and on this and another export lot of 2000 tons, 3.25c., Pittsburgh, was done for sizes over ½ in. and 4c. base on smaller sizes.

The total purchase of locomotives by Belgium in this country appears to amount to 150, the option for 50 additional not having been exercised. It now appears that the remaining 200 of the total of 400 will probably be built by Armstrong-Whitworth, Ltd., in England. The English locomotive makers, including probably the four which have gone into the business since the war, are filled up for about a year and with the Krupp works at Essen, Germany, and enlarged capacity of the Schneider works in France, American exporting of locomotives is likely to meet keen competition.

A New York exporter recently sold 2000 tons of spiegeleisen to Belgium, for shipment in January, price not announced.

Norway and Sweden are inquiring for rails totaling about 40,000 tons. An order was received recently from the Dutch East Indies for 500 tons of structural material and the exporter has had a number of inquiries from the same source for sheets and plates, but is unable to fill them. Belgium is inquiring for a great deal of material, but has not yet become used to the high prices and is not buying as heavily as she probably will a little later.

TOOLS FOR BELGIUM

Little Response to Request of Director of Sales of War Department

WASHINGTON, Jan. 6.—Responses of manufacturers of machine tools to a request of the director of sales of the War Department for bids to furnish tools desired by the Construction Metallique of Belgium have been fewer than expected. An inquiry for gear cutting machinery has resulted in only two offers.

Officials of the office of the director of sales say they had reason to believe that, because of congressional pressure upon them to divert surplus machine tools abroad, American manufacturers would be ready to take advantage of the export market offered.

The machine tools in question are those desired by the Belgian organization which are not available in the surplus of the War Department.

Lieutenant Jeanjean, director-general of the Construction Metallique, came to this country recently with a list of about 2700 machine tools desired by the industries of Belgium. Of these about 1800, with a total value of about $2,500,000, can be supplied by the War Department. As a means of giving American manufacturers a chance to supply the 900 remaining tools, which would represent a total of about $1,250,000, War Department officials, rather than allow the Belgians to go to other countries for them, undertook to furnish information as to the needs.

The machine tools desired by the Belgians, which the War Department is unable to supply, include gear cutting machinery, sheet metal working machines, vertical and horizontal boring mills, gap bed lathes, wood working machinery, punches and shears, steam and air hammers. So far specifications have been prepared and sent out on only gear cutting machinery and boring mills.

In setting forth the needs of Belgium, the War Department has urged manufacturers to make their prices as favorable as possible in view of the adverse exchange conditions which tend to operate against purchases by European countries in the United States. No attempt has been made to dictate the prices, although attention has been called to the fact that the price of the War Department to the Belgians is the c.i.f. Antwerp price of 1914 plus 55 per cent.

The two bids received on gear cutting machines have been less than this price, as the advance in their cost since 1914 has not been so great as the average of machine tools.

Lieutenant Jeanjean will return to Belgium in about two weeks. He will not close any orders until after furnishing the Belgian industries with the information gathered by him as to the machine tools available.

In the opinion of War Department officials, the sale of machine tools by American manufacturers to the Belgians is especially desirable because of the fact that the payment will be made in American dollars at New York.

Sale of surplus materials by the War Department during the week ended Dec. 19 totaled $5,324,512, making a total to date of $5,324,512. The total for the week included $325,230 for machine tools and machinery, which brought the total for this class of surplus up to $9,467,561. Ferrous metals and scrap sold during the week totaled $282,300, bringing the total for this class up to $11,824,756. The amount received for all surplus up to date was 51 per cent of the cost.

With the January issue, *Compressed Air Magazine*, 11 Broadway, New York, begins the twenty-fifth year of its existence. W. L. Saunders, chairman Ingersoll-Rand Co., who founded the magazine and has been the editor-in-chief, now retires as editor. He is succeeded by Francis Judson Tiersort as editor-in-chief and general manager. Eugene P. McCrorken, formerly assistant editor of *Engineering and Mining Journal*, becomes managing editor and Walter C. Laros, circulation manager. The size of the publication is now changed to 9 x 12¼ in.

British Steel Exports and Imports in November

Exports of iron and steel from Great Britain in November were 204,223 gross tons, excluding iron ore and including scrap. This does not show any decided increase over previous months and is about equal to the monthly average for the year. There were only two previous months in 1919 in which the exports were larger—August and May at 214,632 tons and 208,179 tons respectively. The low point for 1919 was 109,939 tons in February. In November, 1913, the exports of iron and steel were 430,113 tons, or over twice those for last November. The November exports were less than one-half the pre-war or 1913 rate, when they were 420,757 tons per month. Details of the 1919 exports by months were published in THE IRON AGE, Dec. 4, 1919.

The items which show the largest improvement to Dec. 1, 1919, over the same period in 1918 were rails, galvanized sheets and black plates, wire and steel plates. The data as to the exports of these, as well as a few other important materials, to Dec. 1, 1919, compared with the same period in 1918 and 1913, are as follows:

	To Dec. 1, 1913	To Dec. 1, 1918	To Dec. 1, 1919
Rails	459,870	25,475	114,215
Galvanized sheets	700,540	7,870	153,677
Wire	56,191	4,735	23,869
Plate, ⅛-in. and over	124,736	93,153	223,249
Steel bars	235,022	146,578	229,692
Tin plates	456,081	205,383	261,011
Black plates	66,692	3,468	28,090
Black sheets	62,922	105,963	124,048
Pig iron	881,481	392,250	218,408

Iron and steel imports in November last year continued small, having been 73,516 gross tons as compared with 87,892 tons and 76,163 tons in October and September respectively, the two previous high months for 1919. The lowest imports for 1919 were 14,367 tons in April. Import data on a few items are as follows to Dec. 1, 1913, 1918 and 1919:

	To Dec. 1, 1913	To Dec. 1, 1918	To Dec. 1, 1919
Pig iron	195,100	114,056	147,894
Rails	.....	278	9,203
Blooms, billets and slabs	464,465	20,014	58,608
Iron ore	6,905,026	5,990,919	4,717,536
Manganese ore	530,351	344,208	255,315

British steel makers are importing considerable scrap steel. Last November these imports amounted to 22,907 tons as compared with 1252 tons in November, 1918, and with 6354 tons in November, 1913.

The decline in manganese ore imports is a prominent item in the above figures.

"Disturbed Conditions" Stop a Business

Discontinuance of business as a result of the disorganizing influences that have been set up in industry in the past year is not a common thing, but there have been a few cases. One of the latest is that of the Koch Adjustable Bracket Co., Peoria, Ill., which announces the discontinuance of manufacture "owing to present disorganization of production due to labor unrest and disturbed manufacturing conditions, as well as uncertainty as to what factory costs will be in the immediate future, coupled with the certainty that a material advance in price will become necessary in case of continuance." The company has produced iron brackets continuously for over 30 years and is "not willing to risk losing the confidence and good will of those who have favored us with their patronage by the very unsatisfactory service which alone it is possible to render at the present time." The company adds that as soon as material and labor conditions become settled or improved sufficiently to renew its service on a satisfactory basis it will resume operations.

Cast-iron feet for platforms used in connection with the transveyor or elevating type of hand truck are being marketed by the Cowan Truck Co., Holyoke, Mass. The feet are bolted to the skid and take the wear thus to increase the life of the skid.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

(Prices quoted below represent as closely as they can be given those charged by mills to their regular trade for indefinite shipment. Owing to practical famine in supply of finished steel products and the heavy demand existing, tenders of new business are being made to the mills by jobbers and consumers at higher prices than those quoted below, but as a rule the mills are turning this offered business away.)

Freight rates from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, with revisions effective Nov. 1, 1918, in carloads, to points named, per 100 lb., are as follows: New York, 27c.; Philadelphia, 24.5c.; Boston, 30c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 49.5½c.; Denver, 99c.; Omaha, 59c.; minimum carload, 80,000 lb. to four last named points; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, $1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is $1.315, minimum carload, 40,000 lb.; and $1.25 minimum carload 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c.; minimum carload 46,000 lb. Jacksonville, Fla., all rail, car lots, 41.5c.; less, 59c.; rail and water, car lots, 34.5c.; less, 46.5c. A 3 per cent transportation tax applies. On iron and steel items not quoted above rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural size, 2.45c.

Wire Products

Wire nails, $3.25 to $4.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.50, and shorter than 1 in., $2.00. Bright basic wire, $3 to $3.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3 to $3.50; galvanized wire, $3.70 to $3.95; galvanized barbed wire and fence staples, $4.10 to $4.45; painted barbed wire, $3.40 to $3.75; polished fence staples, $3.40 to $4.50; cement-coated nails, per count keg, $2.85 to $3.75; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 60 per cent off list for carload lots, 59 per cent for 1000-rod lots, and 58 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....$4.10 base
Large boiler rivets.....$4.20
Small rivets, ¼ in., 5/16 in. and 7/16 in. diameter.....50 per cent off list
Machine bolts, hp. nuts, ⅜ in. x 4 in.:
  Smaller and shorter, rolled threads.50 and 10 per cent off list
  Cut threads.....50 per cent off list
  Larger and longer sizes.....40 and 5 per cent off list
Machine bolts, c.p.c. and t. nuts, ⅜ in. x 4 in.:
  Smaller and shorter.....40 and 5 per cent off list
  Larger and longer.....35 and 5 per cent off list
Carriage bolts, ⅜ in. x 6 in.:
  Smaller and shorter, rolled threads.45 and 5 per cent off list
  Cut threads.....40 and 5 per cent off list
  Larger and longer sizes.....30 and 10 per cent off list
Lag bolts.....50 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3.....50 per cent off list
Plow bolts, Nos. 4 to 10.....50 plus 20 per cent off list
Hot pressed nuts, sq. blank.....2.50c. per lb. off list
Hot pressed nuts, hex. blank.....2.50c. per lb. off list
Hot pressed nuts, sq. tapped.....2.25c. per lb. off list
Hot pressed nuts, hex. tapped.....2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank....2.50c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped...2.25c. per lb. off list
Semi-finished hex. nuts:
  ⅝ in. and larger.....65 per cent off list
  9/16 in. and smaller.....70 and 10 per cent off list
Stove bolts in packages.....75-10 per cent off list
Stove bolts in bulk.....75-10-2½ per cent off list
Tire bolts.....60-10 per cent off list

The above discounts are from Nov. 1, 1919.
All prices carry standard extras, Pittsburgh basis.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $52 to $65; chain rods, $65 to $70; screw rivet and bolt rods and other rods of that character, $65 to $70. Prices on high carbon rods are irregular. They range from $75 to $103, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, ½ in., 9/16 in. and larger, $3.35 per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ⅜ in., 7/16 in. and smaller, $3.85 to $4 per 100 lb. in lots of 200 kegs of 200 lb. each or more; track bolts, $4.35 to $4.50 per 100 lb. in carload lots of 200 kegs or more, with the usual extras for small lots. Boat and barge spikes, $3.85 to $4 per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating 200 lb., $13.80 per package; 8-lb. coating, I. C., $14.10; 12-lb. coating, I. C., $15.80; 15-lb. coating, I. C., $16.80; 20-lb. coating, I. C., $18.05; 25-lb. coating, I. C., $19.30; 30-lb. coating, I. C., $20.30; 35-lb. coating, I. C., $21.30; 40-lb. coating, I. C., $22.30 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.35c. to 2.75c. from mill. Bar iron, 3.50c.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜....	50½	24	¼ and ⅜.....	29½	2½
½.....	54½	40	⅝.....	30½	3½
¾ to 3.....	57½	44	½.....	34½	16½
			¾ to 1½.....	30	23½

Lap Weld

2.....	50½	38	1¼.....	24⅝	9½
2½ to 6.....	53½	41	1½.....	31½	17½
7 to 12.....	50½	37	2.....	32½	18½
13 and 14.....	41	..	2½ to 6.....	34½	21½
15.....	38½	..	7 to 12.....	31½	18½

Butt Weld, extra strong, plain ends

¼, ⅜ and ⅜....	46½	29	¼, ⅜ and ⅜...	28½	11½
½.....	51½	39	½.....	33½	20½
¾ to 1½.....	55½	43	¾ to 1½.....	39½	24½
2 to 3.....	56½	44			

Lap Weld, extra strong, plain ends

2.....	48½	37	1½.....	25½	10½
2½ to 4.....	51½	40	1½.....	31½	17½
4½ to 6.....	50½	39	2.....	33½	20½
7 to 8.....	46½	33	2½ to 4.....	35	23½
9 to 12.....	41½	28	4½ to 6.....	34½	22½
			7 to 8.....	26½	14
			9 to 12.....	21½	9½

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots and on butt and lap weld galvanized iron pipe have been nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
3½ to 4½ in.....	40½	3½ to 4½ in.....	—16
2½ to 3¼ in.....	30½	3 to 3¼ in.....	— 1½
2¼ in.....	24	2½ to 2¾ in.....	+ 1
1¾ to 2 in.....	19½	2 to 2¼ in.....	+10
		1¾ to 1⅞ in.....	+20

Standard Commercial Seamless—Cold Drawn or Hot Rolled

	Per Net Ton		Per Net Ton
1 in.....	$327	1¾ in.....	$207
1¼ in.....	267	2 to 2½ in.....	177
1⅜ in.....	257	2¾ to 3¾ in.....	167
1½ in.....	207	4 in.....	187
		4½ to 5 in.....	207

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiations.

Sheets

Makers' prices for mill shipments on sheets of United States standard gage in carload and larger lots are as follows:

Blue Annealed—Bessemer

	Cents per lb.
No. 8 and heavier.....	3.50
Nos. 9 and 10 (base).....	3.55
Nos. 11 and 12.....	3.60
Nos. 13 and 14.....	3.65
Nos. 15 and 16.....	3.75

Box Annealed, One Pass Cold Rolled—Bessemer

Nos. 17 to 21.....	4.15
Nos. 22 to 24.....	4.20
Nos. 25 and 26.....	4.25
No. 27.....	4.30
No. 28 (base).....	4.35
No. 29.....	4.45
No. 30.....	4.55

Galvanized, Black Sheet Gage—Bessemer

Nos. 10 and 11.....	4.70
Nos. 12 to 14.....	4.80
Nos. 15 and 16.....	4.95
Nos. 17 to 21.....	5.10
Nos. 22 to 24.....	5.25
Nos. 25 and 26.....	5.40
No. 27.....	5.55
No. 28 (base).....	5.70
No. 29.....	5.95
No. 30.....	6.20

Tin-Mill Black Plate—Bessemer

Nos. 15 and 16.....	4.15
Nos. 17 to 21.....	4.20
Nos. 22 to 24.....	4.25
Nos. 25 to 27.....	4.30
No. 28 (base).....	4.35
No. 29.....	4.40
No. 30.....	4.40
Nos. 30½ and 31.....	4.45

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin.*	Lead		Spelter	
Dec.	Lake	Electrolytic	New York	New York	St. Louis	New York	St. Louis
30	19.50	19.25	59.00	7.85	7.60	9.35	9.00
31	19.50	19.25	59.25	7.95	7.70	9.35	9.00
Jan.							
2	19.50	19.25	60.12½	8.00	7.75	9.35	9.00
3	19.50	19.25	.....	8.00	7.75	9.35	9.00
5	19.50	19.25	63.75	8.37½	8.12½	9.72½	9.37½
6	19.75	19.50	63.50	8.50	8.25	9.85	9.50

*Due to a typographical error, the tin quotation on Dec. 29 should have been 58.25c. instead of 59.25c.

NEW YORK, Jan. 6.

Buoyantly speculative markets in London have been the principal cause of sharp advances in most of the markets here. Copper has been the least affected, but is fairly active and strong. Tin has advanced sharply but buying is light. Lead is very scarce and considerably higher. Zinc has had a wide advance, due to active foreign demand. Antimony is strong.

New York

Copper.—Demand for copper continues strong both for domestic and foreign account, with the latter predominant. It is estimated that sales in December amounted to 450,000,000 lb., but stocks as well as production are still in excess of demand. Active buying is expected to continue throughout January and thus to considerably cut down the stocks in producers' hands. While the active speculation in London in most of the other metals has not affected copper on this side to any great extent, electrolytic copper in London has advanced in the last two months, from Nov. 5 to Jan. 5, £13 per ton for spot delivery and £11 per ton for futures, the price yesterday being £126 per ton for spot delivery and £128 for futures. This corresponds, at the present rate of exchange, to 21.62c. per lb. for electrolytic for early delivery. We quote the market for first quarter delivery at 19.50c., New York, for electrolytic and 19.75c. for Lake, with the tendency upward, and very little obtainable, apparently, as low as 19.50c.

Tin.—The feature of this market has been the advance on Monday of £17 15s. per ton for spot Straits in the London market, possibly the largest single advance on record. To-day the quotation was slightly lower. Speculation there is rampant and the situation is not thoroughly understood on this side. Because of this the market here for spot Straits advanced to 63.75c. on Monday and 63.50c. to-day, an increase of over 5c. per lb. in the last week. In this market consumers have bought but little tin, but some of them are at present showing an interest due to the fact that the expected reactions have not appeared. Dealers have been the principal buyers, and they are reported to have gathered in most of the cheap lots so that the market at present is up to the cost of import. The sales that were made by importers, however, were substantially below the cost of importation. Futures are quoted at 64c. to 64.50c., at which a little business was done on Monday, but most of the importers are asking 64.50c. and higher. Deliveries into consumption during December were 6965 tons, of which 5300 tons was credited to Atlantic ports. The amount in stocks and landing Dec. 31 was 3438 tons. Imports for 1919 are reported as 35,404 gross tons, as compared with 58,027 tons in 1918.

Lead.—On two consecutive days last week, Jan. 2 and 3, the leading interest advanced its price ¼c. each day, bringing its quotation to 8c., New York, or 7.75c., St. Louis. In each case, however, the outside market kept in advance. Prompt lead is almost impossible to obtain and it is therefore difficult to quote the market. Very few, if any, producers have it to offer. The market may nominally be appraised at about 8.50c., New York, or 8.25c., St. Louis, for early delivery, with February-March generally held at 8.87½c. to 9c. The present tight situation is entirely a matter of supply and demand, and it is expected to last through January and February, after which time the present arrangements for increased production are expected to alter the situation.

Zinc.—This market is extremely buoyant, due to the speculative rise in London early this week of £1 per ton on spot and £2 5s. on futures, bringing the price there to £59 10s. for spot and £61 10s. for futures. In the last two months the London prices have advanced £14 10s. for spot and £16 for futures. To-day the market here is still higher with prime Western for first quarter to first half delivery quoted at 9.50c., St. Louis, or 9.85c., New York, an advance of ½c. in the last week. The foreign demand is very strong, and it appears as if domestic consumers who have not covered for their requirements will have to meet fairly high prices.

Antimony.—The market is a little more active and higher at 9.75c., New York, duty paid, for wholesale lots for early delivery.

Aluminum.—Virgin aluminum, 98 to 99 per cent pure, is quoted nominally at 31.50c. to 32.50c. for wholesale lots for early delivery.

Old Metals.—The market is firm. Dealers' selling prices are reported as follows:

	Cents per lb.
Copper, heavy and crucible	19.50
Copper, heavy and wire	18.50
Copper, light and bottoms	16.75
Brass, heavy	13.25
Brass, light	9.75
Heavy machine composition	18.00
No. 1 yellow rod brass turnings	11.00
No. 1 red brass or composition turnings	16.00
Lead, heavy	7.00
Lead, tea	4.75
Zinc	6.00

Chicago

CHICAGO, Jan. 6.—There is a pressing demand for copper from practically every legitimate consumer. Lake copper for immediate and first quarter delivery is commanding 20c. per lb. Tin is strong in sympathy with the marked advance in London yesterday and is selling at from 63c. to 65c. for spot shipment. Lead and spelter are firm in sympathy with the export demand. Antimony presents no unusual features. We quote Lake copper 20c. for carloads, tin 63c. to 65c., lead 8c. to 8.10c., spelter 9c. to 9.10c. and antimony 10.50c. to 11c. On old metals we quote copper wires, crucible shapes, 16.50c.; copper clips, 16.50c.; copper bottoms, 15c.; red brass, 16.50c.; yellow brass, 12.50c.; lead pipe, 6c.; zinc, 6c.; pewter, No. 1, 35c.; tinfoil, 40c., and block tin, 50c., all these being buying prices for less than carload lots.

St. Louis

ST. LOUIS, Jan. 5.—The non-ferrous markets are generally stronger and higher, with quotations in car lots as follows: Lead, 8c.; spelter, 9c. to 9.10c. In less than car lots the quotations are: Lead, 8.25c.; spelter, 9.50c.; tin, 65c.; copper, 21.5c.; antimony, 11c. In the Joplin district ores were marked up as a result of the higher prices for lead and spelter and the tonnage changing hands was larger than for some time. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8c.; heavy yellow brass, 10c.; heavy red brass, 13c.; heavy copper and copper wire, 16c.; pewter, 35c.; tinfoil, 43c.; zinc, 4c.; lead, 4.50c.; tea lead, 3.50c.; aluminum, 22c.

The State Iron & Metals Co., Canton, Ohio, has been incorporated with a capital stock of $60,000 and will take over the Berkman Iron & Steel Co. The officers are: Louis H. Kaven, president; B. M. Berkman, vice-president, and Davis Levin, secretary-treasurer. The company will deal in scrap iron and metals.

The American Metallurgical Corporation, Philadelphia, announces the sale to the York Hardware & Brass Works, Inc., a 1000-lb. revolving electric furnace of the Weeks type for melting brass and copper alloys.

PERSONAL

Edward J. Kearney, secretary-treasurer Kearney & Trecker Co., Milwaukee, manufacturer of milling machines, returned home Dec. 27 from a three months' trip to Europe, where he investigated commercial conditions with special reference to export machine tool trade. Mr. Kearney said two outstanding facts were fixed in his mind by his tour, namely, the United States must ratify the peace treaty without delay in some form, and it must extend credits to prevent the European exchange situation from going to the point of disaster. Mr. Kearney takes the view that a panic in Europe would become worldwide in effect. Wherever he went, said Mr. Kearney, the principal topic of discussion was a plea for extension of credits by America.

W. J. Garrod has resigned as superintendent of the John Deere Harvester Works of Deere & Co., at East Moline, Ill., for the purpose of taking a rest prior to accepting a responsible position with the H. F. Wilcox Oil & Gas Co., Tulsa, Okla., of which he is a director and is financially interested. For the past seven years Mr. Garrod has been associated with the Deere Harvester Works as purchasing agent, and during the past one and a half years served as purchasing agent and superintendent. Previous to employment with Deere & Co., he was with the International Harvester Co., McCormick Harvesting Machine Co., and Deering Harvester Co., during a total of about 15 years.

J. R. Matthews now represents the Mahr Mfg. Co., oil burning equipment, Minneapolis, Minn., in the state of Michigan, with headquarters at 205 Kresge Building, Detroit. Mr. Matthews was formerly with the same company at New York. H. H. Keeler, who was formerly with the company at Seattle, Wash., now represents it in the northern Ohio field with headquarters at Cleveland, succeeding F. N. Brooker, who is no longer connected with the company.

After serving for eight years as sales engineer of S K F ball bearings, and recently as New England district manager for the S K F Industries, Elliott A. Allen has organized the Allen Spindle Corporation, with $55,000 capitalization, to manufacture ball bearing textile spindles. The company has leased a modern spindle plant and additional machinery is being purchased. The headquarters of the Allen Spindle Corporation are in the Little Building, 80 Boylston Street, Boston.

Howard C. Seaman, for many years secretary and treasurer of the E. W. Bliss Co., Brooklyn, with which company he had been associated all of his business life, has resigned to engage in other business. One of his new connections will be with the Mid-Texas Oil Co. James Skinner, works manager for the Bliss company, has been appointed assistant secretary and treasurer and will take up some of the duties of Mr. Seaman.

Markt & Hammacher Co., New York, export merchant, announces the newly elected officers as follows: G. Vintschger, chairman of the board; E. Vintschger, president; Ad. Leewitz, first vice-president; Carl Baumgard, second vice-president; Adolf Pollitz, treasurer; T. M. Debevoise, secretary.

M. Bock & Son, Buffalo, announce that M. Bock has retired from the firm which he founded about 50 years ago. Charles Bock will continue the business under the old name. The offices were removed Jan. 1 from 32 West Bennett Street to 906 Morgan Building.

Richard C. Scanlon, assistant purchasing manager for the Newport News Shipbuilding & Dry Dock Co. at its New York office, Woolworth Building, has resigned to accept a position with the Bethlehem Shipbuilding Corporation at Sparrows Point, Md.

Alfred K. Barker, for five years manager of the steel department of W. R. Grace & Co., New York, has resigned, effective Dec. 31.

Howard E. Jeffries, for 33 years in the treasurer's department of the Carnegie Steel Co., Pittsburgh, has been appointed assistant treasurer, succeeding William R. Conrad, resigned after a service of 33 years, and who retires to enjoy a much-needed rest. Harry F. Bockstoce has been appointed assistant to the treasurer, a new position.

H. Lindberg, for several years production manager of the Cadillac Motor Car Co., Detroit, has resigned.

Paul Caldwell, sales manager in New York for the Cleveland Crane & Engineering Co., Wickliffe, Ohio, has resigned to re-enter the employ of the General Electric Co. at Pittsburgh. Mr. Caldwell left the General Electric Co. a year ago and is returning to his former position.

A. L. McMeans has resigned as secretary of Dodge Brothers, Detroit, after 15 years of association with that company. He will engage in business for himself.

E. W. Goodnow, who has been with the Dail Steel Products Co., Lansing, Mich., will assume an executive position about Feb. 1 with the Atlas Drop Forge Co., of the same city. He has been secretary and sales manager of the Dail company and will retain his financial interest in the latter and will also remain on the board of directors.

I. F. Baker, for two years in the New York office of the Westinghouse Electric International Co., has gone to Japan to act as its special representative in that country. Mr. Baker entered the graduate student course of the Westinghouse company in 1908, later serving in various capacities in the resale and contract sections of the sales department. In 1913 he was transferred to the foreign department, which later became the Westinghouse Electric International Co.

Park Bachman, who had charge of the fireproofing department of the Sharon Steel Hoop Co. at its Haselton plant, has resigned.

H. E. Field, general manager of the Wheeling Mold & Foundry Co., Wheeling, W. Va., tendered a dinner and smoker to the forty-nine foremen at the works at the local Country Club, Dec. 19.

Edward C. Smith, assistant general superintendent at the plant of the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., has been appointed acting general superintendent to succeed W. P. Starkey. He has been with the company for the past 15 years in the positions of electrical engineer, safety engineer and assistant general superintendent.

Ray Green, formerly secretary to the assistant general superintendent of the Youngstown Sheet & Tube Co., Youngstown, Ohio, now is associated with the Ohio Steel Products Co., Niles, Ohio.

Tom J. Scott, for many years plant superintendent of the Albey-Ferguson Co., Cincinnati, left the company Jan. 1 to assume general management of the Scott-Spencer Automatic Tool Co., Inc., of which he is president.

Ivan P. Tashof, specialist in inventions relating to the chemical, electrochemical, and metallurgical industries, announces the opening of an office in the Victor Building, 724 Ninth Street N. W., Washington, D. C., for the practice of patent and trade-mark law.

Frank D. Heyburn, Edward Evans, Guy P. Bible and Morris E. Neeley, all of whom have been associated with the Horace T. Potts & Co., iron and steel merchants, Philadelphia, for many years, were admitted as partners in the firm on Jan. 1.

E. W. Pittman, formerly chief engineer of the John Eichleay, Jr., Co., has been appointed general manager of the Dravo Contracting Co., engineering works department, Pittsburgh.

J. R. Richards, formerly with the Fairbanks Co., New York, has been transferred to the Philadelphia office.

Charles R. Miller, works manager of the Toledo, Ohio, plant of the Willys-Overland Co., has resigned and on Jan. 1 became general manager of the Allen Motor Car Co., Columbus, Ohio.

S. W. Harvey, formerly storekeeper of the Hartford Electric Light Co., has been appointed purchasing agent of the Connecticut Electric Steel Co., Inc., Hartford, Conn.

John Barnard, formerly construction engineer Standard Parts Co., Cleveland, has become associated with the McCann-Harrison Co., engineer and contractor, Cleveland, in charge of sales and publicity.

John J. Granfield will represent Harold A. Wright, 40 Court Street, Boston, machine tools, in the western part of Massachusetts, with headquarters in Springfield. Mr. Granfield formerly was connected with the Jefferson Union Co., Lexington, Mass.

Bernard Ginsburg has resigned as vice-president of the Grant Iron & Metal Co., Dime Bank Building, Detroit, Mich., and has also sold his interest in the company, and is now on an extensive trip to California for his health. Harry Alvin, who has been with the company for several years, will be elected an officer in Mr. Ginsburg's place.

A. F. Blouin, factory manager of the Maxf Grinding Wheels Co., Chester, Mass., has sailed for France in the interest of the company.

G. A. Maltby has been appointed resident agent of M. A. Hanna & Co., dealers in pig iron, ore, coal and coke, for Detroit, succeeding E. R. Stoughton, who died a few weeks ago.

A. A. Bialas, formerly manager of sales Columbia Steel & Pittsburgh Shafting Co., and widely known in the cold-finished steel trade, has resigned and has not as yet made any definite plans for the future.

T. J. Atkinson, formerly coke sales manager, J. W. Johns, coal sales manager and A. A. Straub, vice-president and general manager of the Superba Coal & Coke Co., Frick Building, Pittsburgh, have all resigned, effective from Jan. 1 and have organized a new company to be known as the Straub-Atkinson Coal & Coke Co., to deal in coal and coke with offices in the Union Arcade, Pittsburgh.

J. W. Brainard, for many years with the sales department of the Carnegie Steel Co. at Pittsburgh, has resigned, effective Jan. 1, and in the future will give his entire attention to the J. W. Brainard Steel Co., now building a plant at Warren, Ohio, of which he will be president. The new plant will be in operation in a short time and will manufacture the Brainard patented slack barrel hoops, both black and galvanized, the Brainard patented steel heads for slack cooperage, and also the Fowler high grade cooper's rivets. This new plant will be in operation very early this year.

William S. Stubbs, former sales manager, and C. K. Olberg, former vice-president and secretary, are no longer connected with the International Metal Mfg. Co., Philadelphia. John A. Call, president, has assumed the general sales management, and C. W. Wylam, the production management.

R. E. Powell has been placed in charge of advertising and publicity of the Aluminum Co. of America, Oliver Building, Pittsburgh.

Officers of the new Federal Forge Co., Lansing, Mich., are: President and general manager, M. R. Carrier; board of directors, Clarence E. Bement, vice-president, general manager Novo Engine Co., Lansing; Harry Harper, president and general manager Prudden Wheel Co.; Hugo Lundberg, vice-president of the Michigan Screw Co.; Samuel H. Carpenter, secretary and treasurer, and general manager of the Atlas Drop Forge Co.; John P. Hopkins, vice-president and general superintendent Atlas Drop Forge Co. The company is building a 20-hammer plant intended to be in operation early in April. It will do a general drop forge business in lighter forgings.

Nelson A. Gladding, vice-president of E. C. Atkins & Co., saw manufacturers, Indianapolis, has been named by the Secretary of the Treasury as a member of the group committee for Panama, in connection with the second Pan-American financial congress to be held in Washington, Jan. 12 to 17.

OBITUARY

EDWARD W. MERRILL, long connected with the hardware and manufacturing business, died Dec. 28. He was identified with Merrill Brothers, Brooklyn, makers of turnbuckles, drop hammers, drop forgings, clevis nuts and shackles steel bar vises. He was born in New York in 1831. In early life he entered the hardware business which had been established by his father, Charles Merrill, at the corner of Grand and Lewis streets, New York. Later a manufacturing branch was started in Brooklyn, the combined business being known as Charles Merrill & Sons, the personnel comprising Charles Merrill and his four sons. In 1866 the hardware and manufacturing interests were separated and the deceased, with his brother Manning, conducted the manufacturing end and formed the partnership of Merrill Brothers, continuing the making of forging hammers, drop hammers and special machinery; being the oldest concern now in existence manufacturing the friction board drop hammer. Later the manufacturing of turnbuckles was started, they being the first concern to make turnbuckles by machinery. The factory for a great many years was located at Kent Avenue and South Eleventh Street, Brooklyn. In 1906 the business was incorporated, at which time the deceased gave up all active participation in its affairs, which have since been carried on by his three sons, Edward W., Jr., George H. and Whitney Merrill, at the new works in Maspeth, Queens Borough, New York.

GEORGE RHODES CULLINGWORTH, vice-president the Garvin Machine Co., New York, died Dec. 15. He was born Aug. 24, 1837, in Manayunk, Pa., which was then a suburb of Philadelphia. He attended public school there until about 16 years of age, when he entered business with his father in Philadelphia, where he served his apprenticeship. He left this place in 1857 to work for Bennett, Dougherty & Sons, Philadelphia, and left there in 1859, going to Hartford to work for Colts Armory. From there he went to the Star Armory at Yonkers as a tool maker. From Yonkers he went to a gun shop in Trenton, N. J., where he had a contract for making guns. In 1865 he went to work for E. E. Garvin & Co., leaving there in 1870. After selling out his interest in the Ingersoll-Rand Co. he went to work for the Garvin Machine Co. He was a member of the American Society of Mechanical Engineers.

EZRA FRED WOOD, a director and also consulting engineer of the International Nickel Co., 43 Exchange Place, New York, died suddenly of heart disease in the subway Jan. 5. He was 61 years old. Until two years ago, he was first vice-president of the International Nickel Co., which he assisted to organize in 1902 at the time he left the Carnegie Steel Co. He was graduated from the University of Michigan and was with the Carnegie company for twenty years. He was a recognized authority on metallurgy. He had on his person at the time of death a passport for visiting China and the Far East for pleasure and health.

WILLIAM FIRTH died at his home, the Grange, Chestnut Hill, Brookline, Mass., Dec. 27, after a brief illness. Mr. Firth was one of the leading importers of textile machinery in the country and in Canada. He was born in Yorkshire, Eng., 63 years ago, and although he spent many years abroad he became an American citizen. His business will be continued under his name by his partner, Joseph J. Smith, Boston.

MRS. LILLIAN EVERHART, president Challoner Co., Oshkosh, Wis., died suddenly at the home of her daughter in Milwaukee on Dec. 29. She was the widow of George C. W. Everhart, founder of Challoner Co., who died in 1911, since which time Mrs. Everhart was president and active manager of the business. The company manufactures horseshoes, calks, non-skid devices for motor trucks, and also makes wood and metal cutting machines.

Short Trade Items

The American Metal Co., Ltd., has purchased the entire business of L. Vogelstein & Co., Inc., as of Jan. 2, 1920, and L. Vogelstein has acquired a substantial interest in the American Metal Co., Ltd. He has been elected a vice-president of the latter company, and will take an active part in its future management. The entire organization of L. Vogelstein & Co., Inc., has been taken over by the metal company, and all contracts and engagements of the Vogelstein company extending beyond Jan. 2 will be for account of the American Metal Co., Ltd.

Annual nomination and election of representatives under the Representation of Employees system at the works of the Youngstown Sheet & Tube Co., Youngstown, Ohio, was conducted recently. There was much interest in the selections and results in many of the divisions were closely contested.

The assets of the Barnum Richardson Co., Lime Rock, Conn., manufacturers of car wheels, were offered for sale at a public auction held in the Winsted, Conn., courthouse, by Horace W. Davis, New York, counsel representing the receiver, as ordered by the court. One bid was submitted, in alternative form: $220,000 cash for the assets of the company, or the payment of a dividend on claims of the bondholders and other creditors, which would call for an estimated payment of $250,000. This bid was made by Eugene E. Anderson, Sharon, Pa., who represented himself and others, and is subject to confirmation by the court. The company owns ore mines in Litchfield County, Conn.

The Founders' Association of Cleveland at its recent annual meeting elected the following officers: President, Ralph H. West, West Steel Castings Co.; vice president, W. F. Swift, City Foundry Co.; treasurer, A. H. Chappelka, Chisholm-Moore Mfg. Co.; secretary, E. W. Beach, Ferro Machine & Foundry Co.; executive committee, J. H. Francis, Kilby Mfg. Co., and J. H. Bruce, Bowler Foundry Co., representing the heavy foundries, Henry Molder, Best Foundry Co., Bedford, and Charles Seelbach, Jr., Forest City Foundry & Mfg. Co., representing the light foundries, and J. J. Bever, Otis Steel Co. and George Balkwill, Cleveland Steel Castings Co., representing the steel foundries, and George Hamink, City Brass Foundry Co., representing the aluminum foundries. Ira S. Gifford was re-elected executive secretary by the executive committee.

Rolling mill machinery is being delivered to the new plant of the Newton Steel Co. at Newton Falls, Trumbull County, Ohio, of which Edward F. Clarke, former president of the Liberty Steel Co. at Warren, Ohio, is president. The initial installation will consist of four roughing mills, and it is expected to commence producing black plates about March 1. The mills will be electrically driven.

The Trumbull Steel Co. is again approaching normal schedules. The Carnegie Steel Co., Youngstown Sheet & Tube Co., Mahoning Valley Steel Co., and Sharon Steel Hoop Co. are operating practically all finishing units.

The National Malleable Castings Co., Sharon, Pa., states that the new steel building being erected at its plant at Sharon is an addition to one of its foundries and replaces an old structure. It is expected that this addition will be used in the manufacture of steel anchor chains, but this is not a new business with this company, as it has formerly been handled by its Woodhill Road plant, Cleveland, and it is the intention to transfer this business to its Sharon plant.

The report of the Republic Motor Truck Co., Inc., for the year ending June 30, last, just issued, shows a surplus after all charge but common dividends of $495,603, which is equal to $4.95 per share on the company's outstanding common stock. During the previous year the company earned $6.79 on its common stock. Sales for the past year were $16,513,377; for the previous year they were $20,522,380. Operating profits were $1,170,468 and $2,772,831, respectively.

The Osborne & Stephenson Mfg. Co., automobile accessories, has been absorbed by the Newton Mfg. Co. Both plants are located at Plainville, Conn., the former being operated for the past thirty years. The Newton Mfg. Co. is to increase its capitalization from $50,000 to $100,000. The officers of the new company are: Charles H. Newton, president and treasurer; Henry N. Hanson, vice-president; William E. Kelvie, Jr., secretary. The officers constitute the board of directors.

Some changes in the merchandising policy of the R. D. Nuttall Co., Pittsburgh, went into effect Jan. 1. Under the new arrangement the Westinghouse Electric & Mfg. Co. salesmen all over the United States will handle the railway and mine products of the R. D. Nuttall Co., while all industrial lines and other products of the Nuttall Co. will be taken care of in the future, as in the past, through its main offices at Pittsburgh.

The annual convention of engineers and salesmen of the Blaw-Knox Co., Pittsburgh, was held at its general offices at Hoboken, Pa., where its plants are located, and was attended by about 300 representatives. Conventions were held Dec. 3, 4, 5 and 6, at which business policies and plans were made and discussed for 1920. Luncheons were served at noon and dinner in the evening, at which addresses were made by officials of the company and others. The sessions were closed on Saturday evening, Dec. 6, by a banquet, at which the principal speaker was the Hon. Abram Elkus, Justice of Court of Appeals of New York State, and former Ambassador to Turkey.

The Wolverine Tube Co., Detroit, formerly located at Thirty-third and McGraw avenues, has moved to its new home at 611-625 Central Avenue, where it has larger facilities for producing its line of small sizes of seamless brass and copper tubing. The present plant consists of two and one-half acres of land and 30,000 ft. of floor space. This company was purchased last April by a group of men who have long been connected with this industry, and the expansion of the business has been rapid.

The Ross Mfg. Co., maker of an emery wheel dresser, has moved into its new plant at 3160 West 106th Street, Cleveland.

Moorhead Brothers & Co., Inc., Sharpsburg, Pa., inaugurated operations at its puddling furnaces, effective Dec. 29. The plant has been idle about two months. It is planned to start up the plate mills at an early date. About 200 men are being employed.

The name of the Aluminum Castings Co., Cleveland, has been changed to the Aluminum Manufacturers, Inc. New capital to the extent of $5,000,000 has been interested. The actual direction of the company has not been changed.

The Tivani Electric Steel Co., Belleville, Ont., plans to erect a foundry on the water front and to construct piers. The buildings will cost $250,000. Reduction furnaces and rolling mills at a cost of $4,000,000 will be installed. Hamilton & Hansel, Park Row, New York, are the consulting engineers.

The Holbeck pulverized coal system is to be used for heating operations in the Benton Harbor Malleable Foundry Co., Benton Harbor, Mich., and the Muncie Malleable Casting Co., Muncie, Ind. The apparatus is to be installed under the direction of C. F. Herington, district manager of the Bonnot Co., at Chicago.

Alley & Page, pig iron and coke, 16 Exchange Place, New York, have taken the agency for a new product, "diamond grit chilled shot," known as "the scientific metallic blasting abrasive" and manufactured by Harrison Brothers, Inc., Amesbury, Mass., for foundry purposes.

The Niebling-Markstein Co., Cincinnati, air compressors and refrigerating machinery, has changed its name to the Cincinnati Refrigerating Machinery Co. There has been no change in the ownership or personnel. F. W. and E. M. Niebling are no longer connected with the company.

NO PRICE ADVANCES

Judge Gary Explains the Policy of the United States Steel Corporation

After a meeting of the board of directors of the United States Steel Corporation Dec. 30, Judge Gary issued the following statement:

"Judging by present conditions, our business prospects are good and satisfactory. We have been asked many times for our statement of policy in regard to future prices of our steel products. Obviously, no one can state with a feeling of certainty what action will hereafter be taken or decision made concerning business matters. However, I will state it is our present policy and determination to adhere to the selling prices of our commodities which were .greed upon by the Industrial Board at Washington on March 21, 1919. The demand is such that prospective purchasers would be willing to pay materially larger prices, and indeed we are informed they are actually paying them. But we think, taking everything into consideration, that we would not be justified in insisting upon or accepting advances at this time. If we did I fear it would have an influence in further increasing generally the high cost of living. This is a time for moderation, even at the risk of some sacrifice."

R. V. Lindabury, counsel, and W. J. Filbert, controller, were elected directors to succeed H. C. Frick and Robert Bacon.

Tribute to Mr. Frick

The following tribute to Henry C. Frick was adopted by the directors:

It is with intense sorrow we are called upon to record the death of Henry Clay Frick, which occurred at his residence in New York, Dec. 2, 1919.

He was a member of the board of directors of this corporation from April 6, 1901, and of the finance committee from Jan. 6, 1903, until the time of his death. After he was elected he attended 183 out of 240 board meetings, and 737 out of 966 committee meetings. These figures show that his attendance was far above the average of those holding similar positions.

Mr. Frick was not only faithful in service, but was efficient in a marked degree. By reason of his large experience and natural talent he was especially qualified to pass judgment on all the questions pertaining to the properties and business in which the United States Steel Corporation and its subsidiaries are interested. He was quick in perception, broad in vision, clear in judgment, and courageous in action. His associates relied largely upon him during all their deliberations.

The corporation at the beginning decided upon policies which, in several respects, were somewhat different from those which had been previously pursued in the management of large business affairs. Therefore, during the early period of Mr. Frick's connection with the corporation he was somewhat doubtful in regard to some of the policies adopted, but was quick to appreciate the reasons presented, and readily became a strong supporter of the idea that large corporations should openly recognize their obligations to others.

Mr. Frick was a stockholder and director in a large number of industrial concerns and, it is believed, he took an active interest and was the leading spirit in most of them; but he probably gave greater consideration to the affairs of the Steel Corporation than to any other. We are glad to acknowledge, on the part of the corporation, a great debt of gratitude for the splendid and painstaking efforts which Mr. Frick contributed in its behalf.

He was aggressive in action after he had reached a conclusion concerning important corporate questions. In private life he was modest, unobtrusive, polite and hospitable. Intimate acquaintance with him was necessary in order to fully estimate his fine qualities of heart and mind. Long association with and knowledge of his character and characteristics secured for Mr. Frick the warm and lasting friendship of all his associates in the Steel Corporation.

Mr. Frick started life as a poor boy. Because of his pluck, energy and natural ability, he succeeded from the start. He reached the front ranks of business activity and became possessed of a colossal fortune. He was a conspicuous example of individual success and furnished convincing proof of the opportunities for progress and prosperity afforded to every honest person in this country. He realized these conditions and chances and was a grateful and loyal citizen. By the provisions of his last will and testament, many of which he had discussed with some of his associates before and after the will was drawn, he demonstrated his considerate desire to add to the education and happiness of the people at large.

Status of Tungsten, Magnesite and Manganese Ore Industries

WASHINGTON, Jan. 6.—The present status of the domestic tungsten, magnesite and manganese industries are touched upon in the annual report of the Tariff Commission. Considerable information supporting bills pending in Congress imposing protective duties as a means of allowing those industries which were built up during the war to gain a permanent foothold, has been collected by the commission. The report says:

Tungsten production in the United States has suffered a relapse from the greatly expanded output of the war period. The cheap, easily mined resources of this material are practically exhausted and a continuation of production depends upon the development of underground operations which require considerable investments of capital. While it has not yet been fully demonstrated that the domestic deposits can long continue a large production, available data indicate they can furnish for some time a substantial amount. The demand for tungsten is not limited to military uses. The war merely emphasized the necessity for tungsten steel tools as factors in industrial efficiency. Only very serious and general business depression would cause a substantial slackening in the consumption of tungsten. Investments of capital necessary to equip and develop tungsten mines in the United States are hindered by doubt as to whether the present, or in fact any, stabilized prices will be maintained. There are producers in the United States who can market tungsten at $12 or less a unit, but an important part of the present production comes from mines where such low costs are impossible because of the erratic character or low grade of deposits.

Relative to the magnesite industry the report says:

With the return of normal shipping conditions, the American magnesite industry faces the prospect of a serious relapse —almost to the prewar level. Recently developed deposits in Venezuela may be expected to furnish some material to the eastern markets in competition with that from Greece and Canada, but Austrian magnesite will dominate the market, if delivered at anything like prewar prices, which were as low at the Atlantic seaboard, practically the point of consumption, as quotations of the domestic product on the Pacific coast. Under such conditions, the domestic output would be restricted to markets west of the Mississippi, where the consumption is comparatively small. The precise location of the dividing line is dependent upon the balance between ocean freight from foreign countries and domestic rail tariffs from the Pacific coast. On account of the concentration of the steel industry in Pennsylvania, Illinois and neighboring localities, the advantage lies with the foreign producer.

Discussing manganese production, the report says:

Prior to the European war the United States produced less than one per cent of its manganese ore requirements. The remainder was imported mainly from India, Russia and Brazil, in the form of ore and from Great Britain in the form of ferromanganese. Under war conditions, India and Russia were practically eliminated as sources of supply. The productive capacity of the world's major deposits is so much greater than the total demand for ore for steel making that if any single source is eliminated temporarily, the demand can be met by the remaining sources with but little extra effort. Manganese mining on a large scale in the United States is an artificial industry. Under normal trade conditions with a free movement of ore from foreign countries, the United States will contribute only a very limited output. Domestic resources have been carefully estimated and found to be insufficient to supply domestic requirements for more than a few years. The cost of mining is relatively high but that is not the only determining factor. The domestic ore is relatively low grade, obtainable only in small lots and variable in character. Any large dependence on domestic supplies involves the rapid depletion of our limited reserves and a loss in efficiency, due to use of lower-grade material by consumers, aside from the increased cost of domestic ore as compared with the cheaper and more desirable foreign product which is practically inexhaustible and high grade. They are easily accessible and must eventually furnish the American supply. During the war period, a number of mines were opened and equipped to provide manganese for war uses. When the armistice was signed many of these properties had failed to return the invested capital. On the ground that the investments had been undertaken for patriotic reasons, compensation was asked from the Government. Such compensation is under consideration, the manganese industry being one of the four in which such financial losses are being investigated and liquidated by the Secretary of the Interior under the powers of the War Minerals Relief Act of March 2, 1919. O. F. S.

Machinery Markets and News of the Works

YEAR STARTS OUT WELL

Good Machine-Tool Business in All Markets

Chicago Seller Gets $20,000 Order on First Business Day of the New Year—Activity in Eastern Territory

With marked activity in all machine-tool selling centers, the new year starts out auspiciously, most of the trade regarding the prospects for 1920 with a deal of optimism. Indicative of the way business has held up through the holiday period, a Chicago seller received an order for $20,000 worth of tools on the first day following New Year's. The eastern territory is particularly active. Worthy of note are the many reports from various industrial centers of increasing expansion of plant facilities. In several districts this has to do largely with the automotive industries, but other lines of manufacture are also planning new plants or additions to take care of the great demand for all metal products. The scarcity of raw material is apparently the only factor that creates concern.

In New England the General Electric Co. is a buyer for its Lynn, Mass., works, and still has a list of 1920 requirements to purchase. The United Shoe Machinery Corporation, the Deane works of the Worthington Pump & Machinery Corporation and the Rolls-Royce Co. of America are known to be figuring on liberal purchases early this year, the latter company having issued a list of about 50 tools.

The textile machinery interests in New England continue very busy and are buying equipment, notably the Crompton & Knowles Loom Works, Worcester, Mass., and the Saco-Lowell Shops, Boston. The Bantam Ball Bearing Co., Bantam, Conn., will double the size of its plant and is buying tools.

In the New York territory there has been buying by the General Electric Co., E. W. Bliss Co. and others.

Among the new projects reported from Detroit are a plant which Dodge Brothers are expected to build at St. Thomas, Ont., to manufacture automobiles for the Canadian market and a plant for the General Motors Corporation at Grand Rapids, Mich., a 62-acre site having been purchased. The McCord Mfg. Co., Wyandotte, Mich., a large manufacturer of automobile parts, will build a new, large unit.

The Cleveland trade has received fair-sized orders the past week from automobile manufacturers, and is quoting on an inquiry from the Brier Hill Steel Co., Youngstown, Ohio, on about 10 lathes and grinding and drilling machines.

There were a few price changes on Jan. 1, and one large Eastern company withdrew all prices on that date, protecting outstanding quotations for only 10 days. On some lines this company is reporetd to be sold up for all of 1920.

New York

NEW YORK, Jan. 6.

A considerable number of machine-tool manufacturing companies which are holding annual meetings of district sales representatives at the home offices this week will find their New York sales managers, at least, optimistic regarding the course of business this year. Certainly the year has started out under the most favorable auspices, and with a larger volume of business being placed than is customary at this season of the year.

December was a good month, the best of the year for some sellers of tools, and ranking at least second in volume of sales with most of the others in this market. A factor which made December a good month was the prevalence of buying right through the holiday week.

Among the principal buyers of the past week were the General Electric Co., Schenectady, N. Y., which has been a fairly large buyer for several weeks; the E. W. Bliss Co., Brooklyn, which bought several large milling machines, boring mills, etc.; the Farrel Foundry & Machine Co., Ansonia, Conn., which has begun the placing of orders for its new Buffalo plant, which was acquired from the Bethlehem Shipbuilding Corporation; the Redington Standard Fittings Co., Redington, Pa., a unit of the Bethlehem Steel Corporation, which has added to its shop equipment, and the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., which has bought equipment, principally plateworking machines, from its purchasing office, Woolworth Building, New York. The Bantam Ball Bearing Co., Bantam, Conn., which will double its shops for the manufacture of thrust bearings, and the Saco-Lowell Shops, a textile interest at Boston, were prominent among New England buyers.

The Todd Shipyards Corporation, New York, is in the market for several large tools for its various repair yards.

The Société la Construction de Métallique of Brussels, Belgium, whose representatives, headed by M. Jean Jean, are in this country to select a large number of tools from the surplus stocks owned by the Government, have been only partially successful in their mission. The delegation came with lists of specific tools wanted by Belgian manufacturers, and it is understood that only about 600 of these tools could be found among tools owned by the Government. Several hundred more tools are wanted, for which credit arrangements have been made through the United States Government, and the officials of the War Department have been exerting efforts to assist the Belgians in finding such tools at the same prices as the Government quoted on its stocks. M. Jean Jean makes his headquarters at the Hotel Pennsylvania, New York.

A number of crane orders were placed in the last few days of 1919. One manufacturer has increased his prices from 5 to 10 per cent on cranes and hoists. The cranes in the order of the American Car & Foundry Co. for its Buffalo plant, mentioned last week as closed, were purchased of the Shepard Electric Crane & Hoist Co. Among current inquiries are the following: American Tube & Stamping Co., Bridgeport, Conn., 10-ton crane, 36 ft. 10 in. span; Chester Shipbuilding Co., Chester, Pa., 7½-ton and a 5-ton traveling crane bridge with cage, to be delivered on or before Feb. 1; American Smelting & Refining Co., 15-ton machine shop crane; Bethlehem Shipbuilding Corporation, 2-ton, 12 ft. 10 in. span, hand power crane; United States Cast Iron Pipe & Foundry Co., Burlington, N. J., 15-ton jib crane.

The Monahan Stone Co., Newark, N. J., has purchased a 15-ton, 64 ft. span Champion crane. Two Champion high speed, bucket operating cranes have also been placed by Westinghouse, Church, Kerr & Co. for the Armour fertiliser plant, Chrome, N. J., one a 10-ton, 100 ft. span; the other a 5-ton, 60 ft. span. Bagley & Sewall, Watertown, N. Y., have purchased a 30-ton foundry crane, 28 ft. span, from the Chesapeake Iron Works. The Shepard Electric Crane & Hoist Co. has sold the following cranes to the American Car & Foundry Co.: Five 10-ton, 90 ft. span; two 5-ton, 50 ft.

span; one 10-ton, 100 ft. span. The Carpenter Steel Co., Reading, Pa., has purchased two 10-ton Shepard cranes, 42 ft. span and 68 ft. 3 in. span; the U-Knit Concrete Corporation, Newport News, Va., two 5-ton, 34 ft. span; the Borden Brick & Tile Co., Goldsboro, N. C., two 3-ton, 33 ft. span; the American Agricultural Chemical Co., Elizabeth, N. J., one 5-ton, 25 ft. span; Cerney Pickas & Co., Chicago, one 5-ton, 60 ft. span; the Glamorgan Pipe & Foundry Co., Lynchburg, Va., a 10-ton, 52 ft. 6¾ in. span. The American Laundry Machine Co., Cincinnati, a 10-ton, 62 ft. 2 in. span; the Parkersburg Rig & Reel Co., Parkersburg, W. Va., one 7½-ton, 26 ft. 4½ in. span, and a 3-ton, 26 ft. 11 in. span, transfer crane; the American Steel & Wire Co., Fort Wayne, Ind., ten 500-lb. Shepard hoists. An order for three 5 and 10-ton hammer head cranes for the Philadelphia and Norfolk Navy yards has been placed with the McMyler-Interstate Co.

The New York Shipbuilding Corporation, 120 Broadway, New York, has arranged with the United States Shipping Board for the purchase of the four shipways with shop and construction facilities built for the Government at its South Yard, Camden, N. J., at a cost of about $5,000,000. This will give it a total of 18 berths.

The Metal Package Co., 346 Carroll Street, Brooklyn, has filed notice of dissolution.

The Imperial Iron Co., Brooklyn, has been incorporated with a capital of $50,000 by E. H. Green, M. R. Flannigan and C. F. Forman, 743 East 179th Street, New York, to manufacture castings, etc.

The Moto-Meter Co., Long Island City, N. Y., manufacturer of automobile speed meters, etc., has acquired the five-story plant building at 15 Wilbur Avenue, occupied under lease, for a consideration said to be $500,000.

The Motive Parts Corporation, New York, has been incorporated with a capital of $30,000 by A. R. and W. C. Dyer, 5014 Blackstone Avenue, Chicago; and L. C. Garrigan, 116 West Thirty-ninth Street, New York, to manufacture automobile parts.

The Atlantic Fruit Co., 61 Broadway, New York, has plans under way for a sugar mill in Cuba, with initial annual capacity of about 300,000 bags. In addition to plant equipment, the work will include industrial and works buildings for machine repairs, and about 35 miles of railroad. To provide in part for construction and installation, a bond issue of $10,000,000 has been arranged. H. A. Macleod is president.

The Raymond Engineering Corporation, 305 Lafayette Street, New York, manufacturer of metal specialties, is planning for two new one-story plants, 60 x 120 ft., at Farmingdale, N. Y., to cost about $175,000.

The Kent Machine Works, Inc., Brooklyn, has been incorporated with a capital of $100,000 by T. Forster, G. R. and J. W. Kent, 68½ Columbia Heights, to manufacture machinery and tools.

The New York Sheet Metal Works, 413 East Ninety-first Street, New York, is planning for a one-story plant at 509 East Eightieth Street, to cost about $25,000.

The Coston Signal Co., 24 Water Street, New York, has increased its capital stock from $100,000 to $200,000.

The Tide Water Oil Co., 11 Broadway, New York, subsidiary of the Standard Oil Co., has increased its capital from $40,000,000 to $100,000,000. R. D. Benson is president.

The Standard Steel Car Co., 1920 Broadway, New York, automobile department, has arranged for the construction of a new reinforced-concrete service building and repair works on the block bounded by William and South Jane streets and Ely Avenue, Long Island City. It will provide about 90,000 sq. ft. floor space. Pending completion, the company will occupy a building directly opposite.

The Autan Corporation, New York, has been incorporated with a capital of $2,000,000 by T. F. Thornton, N. I. Skutch and E. L. Rotheim, 100 Broadway, to manufacture razors and cutlery products.

Henry C. Griffin & Co., 143 Varick Street, New York, manufacturers of metal products, have filed plans for their new millwrighting plant at 61-63 Vandam Street, a three-story works, 50 x 200 ft., to cost $90,000.

The Canister Co. of New Jersey, Phillipsburg, N. J., manufacturer of canisters, etc., has arranged for a four-story plant addition, 100 x 241 ft., to cost about $130,000, including equipment.

Fire, Dec. 27, destroyed the pyrometer house at the plant of the Replogle Steel Co., Wharton, N. J. The boiler plant was also damaged.

The Communipaw Steel Co., foot of Jersey Avenue, Jersey City, N. J., has filed notice of change of name to the Communipaw Co.

The American Gas Furnace Co., Spring Street, Elizabeth, N. J., has increased its capital stock from $150,000 to $750,000.

The Smith Rubber & Tire Co., Spingarn Building, 665 Newark Avenue, Jersey City, N. J., has commenced the erection of a new plant near Passaic, N. J. It will have an initial capacity of about 600 tires per day. The company was recently organized with a capital of $1,000,000. John H. McGuire, Passaic, is one of the promoters.

Considerable machinery at the plant of the United States Cartridge Co., Maurer, near Perth Amboy, N. J., was destroyed by fire, Dec. 30, caused by an explosion.

The General Tractors Corporation, Paulsboro, N. J., has inaugurated operations at its local plant and is now giving employment to about 100 operatives. Present production will be increased until full output is under way, now expected early in February, with a working force of about 300 men.

The Craig-Boullion Mfg. Co., 23 Prospect Street, Newark, N. J., has filed notice of organization to manufacture small metal products. Marshall D. Boullion is president.

The S. S. H. Machinery Co., Newark, N. J., has leased a new building, 50 x 100 ft., to be erected at Elizabeth Avenue and Bigelow Street. The structure is expected to be ready for occupancy early in the spring.

The Autocar Co., Ardmore, Pa., has acquired property comprising an entire block at Frelinghuysen, Runyon and Sherman avenues and Concord Street, Newark, N. J., for a service and repair works. The proposed building will cover the entire tract, 200 x 412 ft., providing about 80,000 sq. ft. of floor space.

The Victory Hammered Piston Ring Co., Newark, N. J., has been incorporated with a capital stock of $500,000 by Merritt G. Perkins, Robert A. Anderson and William H. Price, to manufacture piston rings for automobile engines.

The Diamond Electric Specialties Corporation, Newark, N. J., has been organized under New Jersey laws with capital of $100,000, to be affiliated with the company of the same name at 27 West Twentieth Street, New York. Lease of property at 101-103 South Orange Avenue was recently made for the establishment of a new plant for the manufacture of batteries, flashlights, etc. William Abramson, Frank Evans and F. Klang are the incorporators.

The C. E. Bennett Co., New York, has been incorporated with a capital of $25,000 by W. Bruchausen, E. S. White and C. E. Bennett, 301a Monroe Street, Brooklyn, to manufacture electrical products, machinery, etc.

The Transport Service Co., 125 Harris Avenue, Long Island City, N. Y., has arranged for a five-story automobile service building at Harris and Sherman avenues, to cost $200,000, including equipment.

A. H. Grebe & Co., Richmond Hill, Long Island, N. Y., has been incorporated with a capital stock of $50,000 by D. Rigney, L. G. Pacent and A. H. Grebe, Richmond Hill, to manufacture wireless instruments, etc.

The International Motor Co., Plainfield, N. J., has resumed operations at its plant following a shut-down for eight days during the holidays for the first inventory in two years.

The G. Piel Co., 29 Thirteenth Street, Brooklyn, manufacturer of machinery, has leased a factory building on Webster Avenue, Seventh to Eighth avenues, Long Island City, N. Y., for a new works.

A one story machine shop, 100 x 125 ft., to cost about $50,000 equipped, will be erected at East Seventh Street and Foster Avenue, Brooklyn, by the Ascutney Realty Co., 1721 Avenue J, Brooklyn.

The Scientific Machine & Tool Corporation, 57 Jay Street, Brooklyn, has filed notice of dissolution.

The Auto Metal Products Co., New York, has been incorporated with an active capital of $25,000 by A. C. Berard, M. M. Henschel and J. Deloca, 403 East 152d Street.

The Gehnrich Indirect Heat Oven Co., 60 Franklin Avenue, Brooklyn, has construction work under way on a two-story reinforced-concrete plant at Honeywell, Skillman and Buckley streets, Long Island City.

The Brook Iron Works, Inc., New York, has been incorporated with a capital stock of $50,000 by E. H. Lockwood, E. E. Baker and F. P. Rowe, 44 Hampton Court, Brooklyn, to manufacture iron and steel products.

The Micro Piston Ring Co., 116 Nassau Street, New York, has filed notice of dissolution.

The Kellogg-Foster Corporation, Binghamton, N. Y., has been incorporated with a capital stock of $30,000 by E. E and J. Kellogg, and C. Q. Foster, to manufacture instruments and other metal products.

The N. P. Nelson Iron Works is occupying its new shop at 212 Fortieth Street, Brooklyn, which will quadruple its floor space. The company specializes in steel plate products,

such as coal bunkers, ash tanks, chutes, spouts and elevator casings for use in connection with mechanical coal and ash-handling equipment, and wagon loaders for handling coal and salt. N. P. Nelson, formerly with the George Haiss Mfg. Co., is president; and R. P. Meyers, formerly purchasing agent for the Surety Engineering Co., is secretary.

The Higdon Elevator Co., 248 Hudson Street, New York, plans to occupy larger manufacturing quarters about July 1, at which time it expects to install a large variety of machine tools of the direct motor-driven type. G. W. Higdon is president.

Buffalo

BUFFALO, Jan. 5.

The American Body Co., Niagara Street, Buffalo, is taking bids for a two-story addition, 60 x 190 ft., of brick and steel.

The Donner Steel Co., Buffalo, has taken out building permits for a brick and steel pump house, a boiler house and a shipping building to cost $33,000. It has had plans prepared for a one-story addition, 40 x 100 ft., for a pickling works.

The Gelatine Products Corporation, Buffalo, recently incorporated with a capital stock of $1,000,000, has purchased the plant of the International Brewing Co., Niagara and Albany streets and the New York Central Railroad, and is remodelling it for the manufacture of photographic glue.

The Kellogg Mfg. Co., 3 Circle Street, Rochester, is having plans prepared for a heating building, 45 x 58 ft., to cost $15,000.

The Rochester Motors Co., Rochester, will build a factory on Driving Park Avenue, 120 x 132 x 369 ft., one story, to cost $60,000.

The Maxwell Steel Vault Co., Oneida, N. Y., has increased its capital stock from $100,000 to $200,000.

Bodine-Fogg, Inc., Rochester, has been incorporated with $50,000 capital stock by G. W. Bodine, D. B. Fogg and C. S. Bennett to manufacture wood and iron finishing products.

The Utica Cutlery Co., Utica, N. Y., will build a factory, 55 x 223 ft., on Hickory Street.

The International Salt Co., 2 Rector Street, New York, has awarded contract for a boiler house at Ludlowville, N. Y., to cost $300,000.

The Niagara Boiler & Radiator Co., Oliver Street, North Tonawanda, N. Y., has acquired the plant of the P. H. McLain Co., Cleveland Avenue, Canton, Ohio, manufacturer of boilers, etc., and will continue its operation as a branch works. The McLain company was operated by the Weil Brothers Co., Chicago, which recently has been negotiating for the removal of the plant to Batavia. This plan has now been abandoned. The Niagara company is also considering the erection of an addition to its North Tonawanda plant. E. C. Andrews is president.

The Cabo Iron Works, Gowanda, N. Y., has increased its capital stock from $300,000 to $2,000,000.

Fire, Dec. 19, destroyed a portion of the Eastwood plant of the Pierce, Butler & Pierce Mfg. Co., Syracuse, N. Y., with loss estimated at $400,000.

The Ryther & Pringle Co., Carthage, N. Y., is planning for a one-story machine shop, 80 x 200 ft.

The Selden Motor Truck Co., Rochester, N. Y., has closed contracts for 1800 trucks for shipment to England during 1920. The order approximates $5,400,000.

The Medina Stamping & Machine Co., Medina, N. Y., has been incorporated with a capital of $75,000 by T. B. and H. W. Robbins and M. J. Collins.

The Buffalo Clam Shell Bucket Co., Buffalo, manufacturer of steel buckets, has increased its capital stock from $25,000 to $300,000.

The Seneca Iron & Steel Co., Erie County Bank Building, Buffalo, will build an addition to its plant at Blasdell, N. Y., to cost about $25,000.

The Lake Side Forge Co., East Lake Road, Erie, Pa., has completed plans for a one-story forge shop addition, 55 x 75 ft.

Josiah Anstice & Co., 220 North Water Street, Rochester, N. Y., manufacturer of metal products, has completed plans for a one and two-story plant on Humboldt Street, 161 x 192 ft., to cost $75,000.

The Erie Tool Works, Erie, Pa., has filed notice of an increase in indebtedness from nothing to $60,000. Frank W. Bacon is president.

The new plant of the Buffalo Steel Car Co., Buffalo, recently organized, to be located at Cheektowaga, will comprise a series of one story buildings. Plans are being prepared for the first unit, to be located on Walden Avenue. It will be of brick and steel, and equipped primarily for the repair of steel cars, with capacity of about 35 cars a day. This unit, with machinery, including traveling cranes, etc., is estimated to cost about $400,000, and is expected to be ready for occupancy early in March; it will give employment to more than 500 men. Robert H. Parks, former vice-president and general manager of the Canadian Car & Foundry Co., Montreal, is president of the new company; J. C. Bradley and J. G. Bradley, Fidelity Building, are directors.

The By-Products Steel Corporation, Niagara Falls, N. Y., has been incorporated with a capital stock of $250,000 by R. A. Knowles, B. Robillard and C. R. Runnels, to manufacture iron and steel products.

The Baker Gun & Forging Co., Batavia, N. Y., has been acquired by the H. & D. Folsom Arms Co., 314 Broadway, New York. The new owner has taken possession, effective Jan. 1, and plans for expansion, developing a department for the production of automobile parts, in addition to the regular gun and arms manufacture.

The Syracuse Washer Corporation, Syracuse, N. Y., manufacturer of mechanical washing machinery, has arranged for a one-story plant, saw-tooth roof type, 300 x 500 ft., of brick and steel, estimated to cost over $250,000 equipped. Ford, Bacon & Davis, 115 Broadway, New York, are the engineers.

The Smith Wheel Co., 101 North Geddes Street, Syracuse, N. Y., manufacturer of automobile wheels, has awarded a contract to Dawson Brothers, Union Building, for an addition to cost $35,000.

The Nixon Broach & Tool Co., Syracuse, N. Y., has been incorporated with a capital of $100,000 by J. Shahan, K. S. and G. C. Nixon, to manufacture machine parts, tools, etc.

The Universal Instrument & Metal Co., Union, N. Y., recently organized with a capital of $75,000 to manufacture fine tools and instruments, is planning for a plant to cost about $50,000. J. L. Sloan and E. Ehlich, Endicott; and D. S. Mersereau, Union, head the company.

The Corry-Jamestown Mfg. Corporation, Jamestown, N. Y., has been incorporated with a capital stock of $100,000 by D. A. Hillstrom, C. A. Anderson and C. G. Nelson to manufacture metal furniture.

Negotiations have been completed between the Chamber of Commerce, Buffalo, and the Dunlop Tire & Rubber Co., London, England, for the establishment of a local plant for the manufacture of automobile tires, to be operated under the name of Dunlop America, Inc. A tract of land has been secured on the River Road, and the proposed plant, with machinery and equipment, will represent an investment of close to $10,000,000, and give employment to about 5000 persons.

The Tompkins Brothers Co., 538 South Clinton Street, Syracuse, N. Y., manufacturer of textile machinery, will build a one-story plant, 40 x 120 ft., on Talman Street, to cost $80,000.

Pittsburgh

PITTSBURGH, Jan. 5.

The Weirton Steel Co., Weirton, W. Va., will build an addition to its power plant, with installation to include five 600-hp. boilers, underfeed stokers and auxiliary equipment. In the electric generating department, two 7500-kw. turbo-generators will be installed, with accessory apparatus. J. C. Williams is vice-president and general manager; C. H. Hunt is chief engineer.

The National Insulating Co., Parkersburg, W. Va., has been incorporated with a capital stock of $40,000 by J. Marshall, C. D. Forrer and M. E. Hiehle to manufacture insulating equipment.

Fire, Dec. 18, destroyed the double-lift coal tipple of the Pittsburgh Coal Co., West Brownsville, Pa., with loss estimated at $150,000. The structure will be rebuilt.

Robert J. Casassa, Pittsburgh, is said to be planning rebuilding his machine shop and automobile service works at 627 Ridge Avenue, destroyed by fire Dec. 5.

The Ackerman Mfg. Co., Wheeling, W. Va., has been incorporated with a capital stock of $300,000 by Thomas H. Jones, Louis Franzheim and J. F. Bycott to manufacture iron and steel products.

The Allegheny Gear Works, Chatteau and Page streets, Pittsburgh, has filed notice of an increase in capital stock from $100,000 to $200,000. W. H. Thompson is treasurer.

The Carlisle Foundry Co., Carlisle, Pa., has been organized to operate a local plant. Property between Letort and

Spring Garden streets, fronting on the Cumberland Valley Railroad has been purchased and construction will soon be inaugurated on a one-story building, to cost about $50,000, including equipment. The plant will have an initial capacity of 5 tons of castings a day. Caleb S. Brinton is president.

The Gearless Motor Co., Pittsburgh, is having plans prepared by George O. Roberts, Hartje Building, for a one-story plant, 32 x 192 ft., on Flavel Street, East Liberty, for a motor-assembling work.

The Pittsburgh Steel Co., Monessen, Pa., has had plans prepared for new coal and coke unloading wharves on the waterfront at its local property. Ice-breakers will also be constructed. New hoisting and distributing machinery will be installed.

The Twin Valley Motor Co., Johnstown, Pa., is planning for a three-story repair and service building, 66 x 160 ft., at 206 Main Street, to cost $50,000.

The Wilson Snyder Mfg. Co., Pittsburgh, has acquired the property of the Braddock Machine Mfg. Co., Braddock, Pa.

The Gerstner Boiler Works, Thirty-ninth Street and Junction Railroad, Pittsburgh, has increased its capital stock to $200,000. F. P. Gerstner heads the company.

The National Rubber & Belting Co., Charleston, W. Va., has been incorporated with a capital stock of $25,000 by E. L. Jarroll, Homer Wiseman and C. M. Dunnavent to manufacture belting and mechanical rubber goods.

The Three-Leaf Lamp Shade Co., Huntington, W. Va., recently organized, is planning a local four-story plant for the manufacture of metal light deflectors. Edward Meeks is president.

The United Zinc Smelting Corporation, 233 Broadway, New York, is reported to be planning extensions and improvements at its plant at Moundsville, W. Va., to cost about $500,000.

New England

BOSTON, Jan. 5.

The new year opens encouragingly, and although devoid of large individual buying, it has been featured by liberal sales of single machines. The General Electric Co., Lynn, has bought heavily against its 1919 list, which is still incomplete. Indications are that this company, the United Shoe Machinery Corporation, Deane Pump Works, Rolls-Royce and other large prospective customers will not act on 1920 lists for at least a month.

New England machine-tool makers are well booked ahead and are not soliciting business. Every branch of industry using machinery is working at capacity and is remarkably free from labor troubles. Prices are strong and some lines of automatic screw machines have been advanced the past few days.

The Cone Automatic Machine Co., Windsor, Vt., recently placed orders for machine tools, and the Crompton & Knowles Loom Works, Worcester, has bought quite heavily and is out of the market for the time. The General Fire Extinguisher Co., Providence, R. I., bought a small amount of equipment and has inquiries out for more. The Crofoot Gear Works, Cambridge, is buying equipment for its new plant to extend its lines. The William H. Haskell Mfg. Co., Pawtucket, R. I., expansion bolts, etc., is in the market for machine-shop equipment. Other concerns making purchases are: Westgard Machine Co., Wakefield; D. M. Watkins, Providence, R. I.; F. L. Horton Mfg. Co., Roxbury, Mass.; Worcester Pressed Steel Co., Worcester, Mass.; F. B. Lyons Iron Works, Manchester, N. H.; D. Shay, Fall River, Mass.; Bellamy Millwright & Machine Co., 137 Purchase Street, Boston; Boston Gear Works, Norfolk Downs, Quincy, Mass.

Ralph Lapointe, Hudson, Mass., has sold the building erected just before the close of the war for the manufacture of the Whitcomb type of planers, and is to offer for sale all the equipment contained therein. The machine tools are valued at about $50,000.

The report of the consolidation of the Woodward & Powell Planer Co., J. E. Snyder & Son, Stockbridge Machine Co. and the Robbins Machine Co., all of Worcester, Mass., is without foundation. J. E. Snyder & Son, Worcester, manufacturers of upright drills, are six months behind on deliveries and are having difficulty in securing skilled machinists. Its working force to-day is 40, as compared with 60 in normal times. Its Italian representative recently visited Worcester and said that a machine costing $800 f.o.b. Worcester will cost at least $1,800 delivered in Italy because of the rate of exchange.

The Lombard Machine Co., Worcester, manufacturer of carding machines, will erect a foundry in the spring with an initial capacity of about 10 tons, to be increased later. It plans to double its capacity by July 1, and has just perfected a process dealing with metallic breasts. Lawrence E. Whalen has resigned as foreman of the machine department, and is succeeded by John McIntosh, formerly with the Crompton & Knowles Loom Works. Charles Nourse, recently with the Heald Machine Co., Worcester, is manager.

The Powell Machine Co., Worcester, Mass., will begin deliveries on its new 48-in. planer in about three weeks. The company is employing approximately 100 men and contemplates doubling this number as soon as possible.

Bids are being taken on a one-story machine shop for the National Woodworking Co., Dover, N. H. It will have 15,000 sq. ft. of floor space.

The Vitrified Wheel Co., Westfield, Mass., has let contract for its two-story addition, 40 x 80 ft.

Plans are being drawn for an addition to the plant of the Curtis & Marble Machine Co., Worcester, Mass.

Bids are in for the one-story, 40 x 178 ft. factory of the Cameron Appliance Co., Everett, Mass.

The Ionite Co. is erecting a factory at Worcester, Mass., for the manufacture of a non-liquid storage battery, and has bought the plant of the Blake Safe & Lock Co., which it will operate in connection with the new building. Albert H. Williams is president.

Work is about to start on the William Schollhorn Co.'s new factory on Wooster Street, New Haven, Conn. The company manufactures pliers, etc.

According to the latest advices the Bethlehem plant at Squantum, Quincy, Mass., will be turned over to the Government as soon as all destroyers building are completed, which it is expected will be within a few months. The plant will be used to make repairs on small war vessels, and will come under the jurisdiction of the Charlestown Navy Yard commandant, Boston.

A power house, to cost about $500,000, is to be built by the Amoskeag Mfg. Co., Manchester, N. H.

The Northway Motors Corporation, Natick, Mass., has awarded a contract to the J. J. Prindeville Co., Framingham, for a new two-story plant, 70 x 200 ft., to cost $75,000.

The Metal Ball Co., 43 Foster Street, Danbury, Conn., manufacturer of ball bearings, will build a two-story addition to cost about $35,000.

The Moore Drop Forging Co., 36 Water Street, Springfield, Mass., is having plans drawn for a one-story machine shop, 50 x 60 ft.

Manning, Bowman & Co., Meriden, Conn., manufacturers of electric utensils, hardware, etc., have increased their capital from $600,000 to $1,000,000.

Walsh's Holyoke Steam Boiler Works, Appleton Street, Holyoke, Mass., will build a one-story addition, 81 x 146 ft., to cost about $35,000.

The main building and east wing at the plant of the Hope Foundry Co., Auburn, R. I., was destroyed by fire, Dec. 24, with loss reported at $125,000.

The Curtis & Marble Machine Co., 72 Cambridge Street, Worcester, manufacturer of cloth finishing machinery, has had plans prepared for a four-story addition, 75 x 85 ft.

The Olson Mfg. Co., 54 Commercial Street, Worcester, manufacturer of screw machine products, has acquired property at Barber and Wiley avenues, and plans the erection of an addition.

Philadelphia

PHILADELPHIA, Jan. 5.

A power plant to cost about $25,000 will be erected by the Colonial Mills Co., Lena and Armat streets, Philadelphia.

The Neel-Cadillac Co., 144 Broad Street, Philadelphia, is having plans prepared for a service and repair works for automobiles at Parkway and Twenty-fifth streets, to cost over $500,000.

The addition to the plant of the Philadelphia Paper Mfg. Co., River Road, Philadelphia, will consists of a one-story machine shop and engine room, at Nixon and Fountain streets, 165 x 295 ft., estimated to cost $145,000.

The Manning J. Smith Belting Co., 39 East Ashmead Street, Philadelphia, has acquired a two-story factory, 80 x 135 ft., with site, at Church Lane and Lena Street, for a branch plant.

In connection with the new plant of the General Carbonic Co., North Third Street, Philadelphia, a one-story power plant, 25 x 43 ft., will be erected.

The Superior Metal Products Co., Philadelphia, has been incorporated with a capital stock of $15,000 by S., I., and August Foriano, 1537 South Thirteenth Street.

The Sun Shipbuilding Co., Chester, Pa., has commenced the erection of two new shipways, and will enlarge its

local fabricating plants. The new ways will accommodate vessels ranging from 15,000 to 20,000 deadweight tons, and are to be ready by July 1.

The Luzerne Rubber Co., Trenton, N. J., manufacturer of hard rubber goods, has acquired property, 200 x 200 ft., opposite its plant at Muirhead Avenue and Dewey Street, for additions.

The Duco Adding Machine Co., St. Louis, Mo., manufacturer of adding machines, is negotiating with the Chamber of Commerce, Trenton, N. J., for a site for a local plant.

The De Laval Steam Turbine Co., North Clinton Street and the Pennsylvania Railroad, Trenton, N. J., is building a new pattern shop on Nottingham Way. The company will remove its pattern shop on East State Street to the new building, increasing present capacity.

William H. Baker, 450 Norway Avenue, Trenton, N. J., has filed plans for a one-story machine shop on Ward Avenue.

The Crescent Insulated Wire & Cable Co., Olden and Taylor streets, Trenton, N. J., is having plans prepared for an addition on property recently acquired. It will be one-story, of steel and concrete, 50 x 125 ft., to cost, with equipment, about $40,000.

The Manufacturers Foundry Co., Philadelphia, an interest of James R. Wotherspoon, 238 North Front Street, manufacturer of metal products, will build a one-story foundry, 30 x 190 ft., at Sinking Springs, Pa., to cost about $12,000.

The Shippers Car Line, Inc., 165 Broadway, New York, has arranged for the establishment of a new plant at Milton, Pa.

The Laing Refractories Co., Du Bois, Pa., has been incorporated with a capital stock of $10,000 by W. G. Brown and John E. Long, to manufacture refractory products.

The American Car & Foundry Co., Milton, Pa., is outlining plans for additions and improvements to its local plant during the year to cost about $500,000. It is proposed to practically double the present capacity, giving employment to 2000 persons. The company has recently completed extensions and betterments representing an investment of about $750,000.

J. L. Johnson, Ross Street, Wilkes-Barre, Pa., is planning for a two-story machine shop, 50 x 150 ft., at Ross and Gildersleeve streets, to cost about $45,000. A welding department will be installed.

The Schmick Gear & Screw Co., Reading, Pa., has been incorporated with capital stock of $200,000 by Louis D. Anderson, Frank P. Nustle and Earl A. Flicker, to manufacture gears, screw-machine products, etc.

Fire, Dec. 26, destroyed the stone-crushing plant of the Advance Industrial Supply Co., Greystone, near Charmian, Pa., with loss of about $300,000, the bulk of which is in machinery. The plant was three stories, 40 x 125 ft., and contained a complete equipment of reducing, grinding and pulverizing machinery, etc.

The Central Engineering Co., Philadelphia, capitalized at $50,000, has been chartered to manufacture ships, engines, etc. The incorporators are: Arthur M. Kerr, Hudson Heights, N. J.; John L. Jamison, 1607 Cayuga Street, and Eugene H. Martin, 14 North Thirty-sixth Street, Philadelphia.

The Reading Valve & Fitting Co., Reading, has filed notice of an increase in capital stock from $200,000 to $300,000. D. R. Bomberger is secretary.

The Egan-Rogers Steel & Iron Co., Crum Lynne, Pa., machinist and founder, has increased its capital stock from $100,000 to $111,300. John I. Rogers is treasurer.

Detroit

DETROIT, Jan. 5.

The McCord Mfg. Co., Wyandotte, Mich, is planning to increase its facilities by the addition of another unit. It manufactures automobile parts and accessories.

The General Motors Corporation is expected to build a large plant in Grand Rapids, Mich., for the manufacture of automobile parts. It has taken a lease on a 62-acre site.

The Fuller & Sons Mfg. Co., Kalamazoo, Mich., plans to spend $200,000 during this year for extensions. An addition will be made to the main factory, 60 x 100 ft., four stories, adding 24,000 sq. ft. of floor space. A foundry, a new department, will be housed temporarily in a building recently purchased, 150 x 200 ft. It will have a daily capacity of 30 tons of castings and will employ about 100 men. The expansion program will increase the payroll from 660 to 1000 and will enlarge the plant capacity by 40 per cent. The company manufactures motor truck transmissions.

The Clarage Fan Co., Kalamazoo, Mich., has announced an extension program, to cost about $100,000. It includes two additions to its foundry, 28 x 170 ft. and 66 x 70 ft., which will double its present space. A concrete and steel machine shop, half a block in dimensions, with galleries to accommodate machinery, opening on an inner court, will also be erected and equipped with a traveling crane. The addition of another cupola to the foundry is contemplated. The additions will probably not be completed until some time in 1921.

The Standard Castings Co., Lansing, Mich., is razing the building it has occupied for 10 years with its foundry department, for the purpose of erecting an addition.

The General Gas Light Co., Kalamazoo, Mich., will immediately erect a three-story building, 70 x 218 ft., of concrete and steel, the second floor to be used as a machine shop. Two 25,000-lb. punch presses have been ordered. Another improvement will be the erection of a new boiler house and the installation of two new boilers.

The Automotive Sheet Metal Co., Kalamazoo, Mich., has been organized with a capitalization of $100,000, of which $60,000 is paid in, to succeed the McDole Automotive Sheet Metal Co. Negotiations are under way to lease the south structure of the Barley Motor Co.'s plant, using an initial floor space of 20,000 ft. and gradually extending to take in the entire unit with 60,000 sq. ft. The officers of the new company are: President and general manager, C. B. McDole; vice-president, Donald A. Stewart; secretary, O. D. Rose, and treasurer, C. S. Campbell. E. V. Brigham, A. C. Barley and John S. Rockwell are on the board of directors. The company has been specializing on sheet metal work for motor trucks, but will now take passenger-car contracts. New equipment and machinery has been ordered for early installation.

The Superior Seating Co., Muskegon, Mich., will soon erect a three-story addition, including a power plant, to cost $350,000. Its capacity will be increased one-third.

The Columbia Motors Co., Detroit, has acquired the plants formerly occupied by the B. F. Everitt Co., at the junction of Mack Avenue and the Michigan Central Railroad, a few blocks from its present factory. This will provide practically double facilities pending the completion of the proposed new plant. J. C. Bayerline is president.

The Hayes Tile Co., 474 Franklin Street, Detroit, is taking bids for the construction of a one-story top addition, 26 x 100 ft., to be equipped as a machine shop, with estimated cost of $25,000.

The Mutual Electric & Machine Co., 232 Fort Avenue, Detroit, will build a one-story machine shop, 75 x 125 ft., on Porter Street.

The Columbia Motor Co., 1256 East Jefferson Avenue, Detroit, is having plans prepared for a new two-story plant, 300 x 720 ft., at Fort and Boyd streets, to cost about $500,000, including equipment. Horace H. Dane, Dime Bank Building, is the architect and engineer.

The Wadsworth Mfg. Co., Jefferson Avenue, Detroit, manufacturer of automobile bodies and tops, will build a six-story addition at Jefferson Avenue and Connor's Creek, to cost about $400,000, including equipment.

St. Louis

ST. LOUIS, Jan. 5.

The New Orleans Railway & Light Co., New Orleans, will enlarge its main power house and install additional equipment.

The St. Joseph Public Elevator Co., St. Joseph, Mo., will erect a concrete grain elevator to cost $250,000.

The Harry L. Hussmann Refrigerator & Supply Co., St. Louis, P. R. Jackson, manager, will erect a building to cost $140,000 and install about $50,000 of woodworking machinery.

The Clarksville Ice & Cold Storage Co., Clarksville, Ark., is in the market for an ice making plant with a daily capacity of 50 tons.

The Southern Steel Products Co., Tulsa, Okla., Paul D. Murris, Trevor Sanks and others interested, will equip a $100,000 plant for the manufacture of steel products.

The Tulsa Pipe & Supply Co., Tulsa, Okla., is reported in the market for $15,000 worth of machine shop equipment.

The Lawton Star Refining Co., Lawton, Okla., will equip a refinery with a daily capacity of 1000 bbl. C. S. Hollman is general manager.

The Invader Oil & Refining Co., Muskogee, Okla., has increased its capital stock from $2,000,000 to $10,000,000 to extend its refining business.

The Blackmer & Post Pipe Co., Boatmen's Bank Building, St. Louis, is taking bids for the erection of a one-story

machine shop, 40 x 82 ft., at Arsenal and Woods streets, to cost about $10,000.

Plans are being completed by the Century Electric Co., 1827 Pine Street, St. Louis, manufacturer of electrical products, for its proposed new six-story plant, 90 x 120 ft., to cost about $200,000. E. S. Pillsbury is president.

The Paramount Refining Co., Shreveport, La., recently organized, is planning for the erection of a new refinery with daily capacity of about 7000 bbl. E. C. Richardson, Shreveport, is president, and George A. Todd, Oklahoma City, Okla., vice-president.

Fire, Dec. 20, destroyed the measuring plant at the works of the Empire Oil & Gas Co., Cotton Valley, near Oklahoma City, Okla., with loss estimated at $100,000.

The Kansas City Railways Co., Kansas City, Mo., is planning for the construction of a one and one-half story power plant, 50 x 62 ft., on James Street, Kansas City, Kan., to cost about $27,000.

Baltimore

BALTIMORE, Jan. 5.

The addition to the plant of the Curtis Bay Copper & Iron Works, Curtis Bay, Baltimore, will be used for increased output and is estimated to cost about $100,000, including machinery. It will be one-story, 75 x 230 ft.

The Hampstead Implement & Supply Co., Hampstead, Md., has been incorporated with a capital stock of $20,000 by Herbert B. Miller, James T. Yingling and John U. Leister, to manufacture agricultural implements, etc.

The Bethlehem Steel Co., Sparrows Point, Md., has awarded a contract to the Hughes-Foulkrod Co., Commonwealth Building, Philadelphia, for a one-story, brick and steel addition, 50 x 92 ft., to cost $35,000.

The Burt Machine Co., 401 East Oliver Street, Baltimore, manufacturer of labeling machines, etc., has completed plans for a three-story machine-shop addition, 30 x 40 ft., to cost $12,000.

The Bureau of Yards and Docks, Navy Department, Washington, is taking bids for a four-story brick and reinforced-concrete pattern shop, 125 x 441 ft., at the navy yard, Norfolk, Va.

The Atlas Portland Cement Co., 30 Broad Street, has acquired the plant and business of the New Portland Cement Co., Leeds, Jefferson County, Ala. It is planned to approximately double its capacity of about 3000 bbls. a day.

The Birmingham Machine & Foundry Co., Birmingham, Ala., is considering the rebuilding of its machine shop on Tenth Avenue recently destroyed by fire with loss estimated at $25,000.

The Kilby Frog & Switch Co., Birmingham, Ala., is planning an addition of about 11,000 sq. ft. floor space to cost about $30,000.

A flour milling plant to cost about $1,000,000 including equipment, will be erected by W. P. Tanner, Gross & Co., 25 Beaver Street, New York, on a waterfront site at Baltimore.

The Hoops Mfg. Co., Savannah, Ga., has been incorporated with a capital stock of $25,000 by H. H. Hoops, J. R. Lovett and J. P. Taggart, to manufacture oil burners, etc.

The proposed new plant of the Champion Motors Corporation at Baltimore, will be located on a three-acre site which the company, recently organized, has acquired. The initial plant is estimated to cost about $100,000 and will be devoted to the manufacture of light motor trucks in addition to pleasure automobiles and parts. It is proposed to develop the works to a capacity of about 6000 cars per year. About 400 persons will be employed for initial operations. Henry Crowther of the Direct Drive Motor Co., Pottstown, Pa., is president of the company; J. Kemp Bartlett is vice-president.

The Murray Auto & Parts Co., Atlanta, Ga., is planning a local plant for the manufacture of sheet-metal automobile specialties, etc.

The Howell Motor Car Co., Baltimore, has filed plans for a two-story automobile service building at 913-27 Bolton Street, to cost about $45,000.

The Greenville Fertilizer Co., Greenville, S. C., recently organized, is planning for a new plant with about 250 tons daily output. The main building will be 150 x 150 ft. A dry-mixing plant is also being considered. W. K. Hudgens is president; and C. G. Hunter, treasurer.

The American Propeller & Mfg. Co., Gittings Avenue and Covington Street, Baltimore, will enlarge its plant and engage in general machine work.

The Mechanical Safety Devices Co., 521 Munsey Building, Baltimore, will erect a plant in Baltimore for the manufacture of a newly patented safety step for automobiles, etc. The company will be capitalized at $500,000. John H. Driver, the inventor, is president, Edgar W. Christie is secretary and Charles H. Schlosser, general manager.

The Ayer-Kempton Corporation, 111 North Charles Street, Baltimore, has been incorporated with $250,000 capital stock to manufacture hardware, motors, engines, etc. The incorporators are Paul Barringer, Jr., George B. Brooks and John G. Jenkins.

The Sun Co., Haines and Warner streets, Baltimore, will build a one-story brick pumphouse.

To engage in the general welding, cutting and riveting business, the Industrial Welding Corporation, 207 Guilford Avenue, Baltimore, has been incorporated by Leo C. Geraghty, Milton Roberts and Clifton S. Brown.

The Steinmetz Electric Motor Car Co., headed by Dr. Charles P. Steinmetz, New York, has been incorporated in Baltimore with $2,000,000 capital stock and plans are being made to establish a large assembling plant for electric trucks and light motor cars. The law firm of Piper, Carey & Hall, Calvert Building, Baltimore, is representing the company. It will require about 100,000 sq. ft. of floor space with room to expand. About 150 skilled mechanics will be employed at the start, but the number will be considerably increased.

In connection with the organization of the Nilson Yacht-building Co., of which Leonard J. Nilson, 2005 East Thirtieth Street, Baltimore, is president and manager, it is reported that a joiner and machine shop and three marine railways for small boats will be built. Prices are wanted on machine and wood-working tools.

The American Cellulose & Chemical Co., Cumberland, Md., is making plans to build an additional plant to cost about $2,000,000. Guy Leonard is general manager.

The Automotive Tractor Co., Frederick, Md., plans to build a one-story foundry and machine shop, 50 x 200 ft.

The Virginia Railway & Power Co., Norfolk, Va., is planning to spend more than $1,000,000, it is said, for additional equipment and improvements. C. B. Buchanan is general manager.

The Murray Auto & Parts Co., Atlanta, Ga., contemplates the establishment of a plant for the manufacture of automobile bodies and sheet-metal parts.

The pattern and machine shop of the Birmingham Machine & Foundry Co., Birmingham, Ala., recently damaged by fire with loss estimated at $25,000, will be rebuilt.

Cincinnati

CINCINNATI, Jan. 5.

Machine-tool builders in this district still report great activity. While no exceptionally large orders have been taken the past week, business is coming in steadily from all parts of the country. Manufacturers are still trying to catch up with deliveries, which are now several months behind, and if the labor were available many plants would be working double shifts. This is particularly true with manufacturers of large boring machines, some being sold as far ahead as July.

Export orders are becoming more scarce, due to the exchange situation, and until more normal rates are readjusted no business from this source is expected. A notable exception, however, is that a large manufacturer of wood-working machinery has received an order from a British railroad for five special machines to be used in car construction.

The Vocalstyle Music Roll Co. has purchased ground in Hartwell, a Cincinnati suburb, and it is reported that it will build a three-story building, with approximately 60,000 sq. ft. of floor space, to cost in the vicinity of $200,000.

The Rapid Electrotype Co., Cincinnati, will erect a fireproof structure on McMicken Avenue, plans for which have been prepared by Zettel & Rapp, architects. Bids are being received for a building, 101 x 215 ft., two stories.

The United States Drill Head Co., Cincinnati, a subsidiary of the United States Machine Tool Co., has been formed to manufacture drill heads and other machine-tool accessories. It will build a one-story plant on Sixth Street, 91 x 100 ft., and when completed will give employment to about 50 hands.

The Columbus Heating & Ventilating Co., Columbus, Ohio, has awarded a contract to the State Construction Co., that city, for an addition to cost $35,000. It will be 100 x 120 ft., two stories in front and saw-tooth construction in the rear. The company recently secured a large order for automobile tanks. G. C. Bowman is president.

The Franklin Tractor Co., Franklin, Ohio, it is understood, will establish a plant at Greenville, Ohio, and has acquired 20 acres, on which will be constructed a steel and concrete building, 100 x 200 ft., with provisions for additions when necessary.

The Bardes Foundry & Range Co. has purchased property adjoining its plant on Colerain Avenue, Cincinnati, and it is reported will erect an addition. An extension is now under way, but to take care of increased output it was found necessary to purchase additional property.

The Ahrens-Fox Fire Engine Co., Cincinnati, has secured, at a price estimated to be $50,000, additional property adjoining its plant on Colerain Avenue, and it is reported contemplates the erection of additions.

Cleveland

CLEVELAND, Jan. 5.

The new year starts with a good volume of activity. Local machinery houses the past week took several orders from automobile and truck builders in the Cleveland and Detroit districts for lots ranging up to 15 machines, mostly of the highly specialized type for reducing the cost of operations on production work. New inquiry for small lots of machinery is fairly active. The Brier Hill Steel Co. has issued another list, including about 10 lathes, and grinding and drilling machines for its Western Reserve plant at Warren, Ohio. The Brown & Sharpe Mfg. Co. Jan. 1 withdrew prices on various lines of its machines, but authorized its selling agencies to protect for 10 days quotations that had already been made.

The city of Cleveland is in the market for a 30-in. lathe and a 4-ft. radial drill for its fire department.

The Cleveland drop forge plant of the Wyman & Gordon Co., Worcester, Mass., has been purchased by local interests and will be operated under the name of the Cleveland Drop Forge Co., which has been incorporated with a capital stock of $750,000. W. J. Fleming, assistant sales manager Bourne-Fuller Co., is president of the new organization; W. C. Saeger, secretary, and R. C. Bourne, treasurer. George C. Stebbins will retain the position as general manager, which he has held for several years, and is also vice-president. The transfer of the property to the new owners will be made in a few days.

The Fisher Body Ohio Co., Cleveland, has acquired a 40-acre site at the corner of Colt Road and East 140th Street, adjoining the New York Central and Belt Line Railroad, on which it will shortly begin the erection of the first unit of its plant.

The Eaton Axle Co., Cleveland, has placed a contract with the Crowell-Lundoff-Little-Bicknell Co., for the first unit of its new plant for the manufacture of automobile axles. It will be one-story, of brick and steel, 300 x 450 ft. Plans were prepared by George S. Rider & Co., engineers and architects, Cleveland.

The Canton Rim Co., Canton, Ohio, has been incorporated with a capital stock of $100,000 and has acquired the former plant of the Buckeye Jack Co., at Louisville, Ohio, to manufacture automobile rims. The present plant will be enlarged. G. C. Allison is president; F. G. Graber, vice-president; William Bernhard, secretary and treasurer, and Charles Doershuck, general manager.

The Arctic Ice Machine Co., Canton, Ohio, plans to erect a foundry for the manufacture of gray iron and semi-steel castings, having 30,000 to 40,000 sq. ft. of floor space, and will shortly build an erecting shop, 140 x 400 ft.

The Standard White Metals Co., Elyria, Ohio, has placed contracts for the erection of a plant. The company has temporary offices at 240 Troxel Building and has been incorporated with a capital stock of $90,000. George Stevens is president and F. M. Stevens, secretary.

The International Steel Tube Co., Leader-News Building, Cleveland, has decided to go ahead at once with the erection of its plant, for which it acquired a 21-acre site at Miles Avenue and 144th Street some time ago. William P. Day, president International Steel Tie Co., is president. Construction has been placed in charge of a committee consisting of Mr. Day, A. W. Foote, R. A. Harmon and C. H. Hopkins.

The W. J. Clark Co., Salem, Ohio, manufacturer of sheet metal products, has sold its plant and business to the Mullins Body Corporation, which will use the site for the erection of an addition for manufacturing automobile bodies.

The Buckeye Jack Co., Alliance, Ohio, manufacturer of lifting jacks, has increased its capital stock to $1,000,000. New officers are O. F. Transue, president; Frank Transue, vice-president; E. C. Bates, treasurer and general manager, and Clem J. Bates, factory and sales manager.

The American Steel Foundries has commenced the erection of an addition, 75 x 250 ft., to the cleaning department of its Alliance, Ohio, plant.

The Alliance Machined Steel Co., Alliance, Ohio, placed its new steel foundry, 140 x 500 ft., in operation a few days ago.

The Carford Motor Truck Co., Lima, Ohio, has increased its capital stock from $5,000,000 to $10,000,000, and plans extensions.

The Berger Iron Co., Akron, Ohio, has increased its capital stock from $500,000 to $1,000,000.

A brass and aluminum foundry will be operated in Norwalk, Ohio, under the name of the Norwalk Brass Foundry by A. A. Hurbig, who has been superintendent of the Norwalk Foundry Co., and C. R. Knapp.

The Universal Machine Co., Bowling Green, Ohio, will build an addition to its plant, to be used for heat treating and a machine shop.

The Alvo Co., Ashland, Ohio, will enlarge its plant and add to its present products the manufacture of non-glare headlights for automobiles.

The Delphos Mfg. Co., Delphos, Ohio, will shortly open a new department for the manufacture of galvanized tubs and pails.

The National Supply Co., Toledo, Ohio, has purchased a site on Stickney Avenue on which it contemplates erecting a plant for the manufacture of oil-well supplies.

The Banting Mfg. Co., Toledo, Ohio, has increased its capital stock from $400,000 to $1,000,000 and is enlarging its plant by the erection of a three-story addition, 56 x 120 ft.

The Flexible File Co., Freemont, Ohio, will be incorporated with a capital stock of $150,000 to succeed the Solid Steel Scissors Co. It is stated that the company's plant will be enlarged. Its principal products will be manicure implements.

The Moore Tool & Machine Co., Newark, Ohio, recently incorporated, has elected Otto N. Moore president and general manager; John A. Chilcote, vice-president, and C. C. McGruder, secretary and treasurer.

The plant of the Jewel Car Co., Newark, Ohio, has been sold to the Newark Trust Co., acting as trustees for the bondholders, the purchase price being $90,000. The new owners do not plan to operate it.

Catalogs Wanted

The T. J. Lane Equipment Co., Springfield, Ohio, is intending to add to its stock a line of transmissions, including wood and steel pulleys, hangers, shafting, pipe fittings, valves, belting, and other supplies, and would be pleased to receive from manufacturers catalogs and information.

Chicago

CHICAGO, Jan. 5.

The new year has opened under favorable auspices and most dealers look forward to a continuation of the activity of the past few months. One seller booked $20,000 worth of business on the first working day of 1920, and reports from others are likewise encouraging. At present there are no large inquiries before the trade, perhaps the most important being one for a shaper, engine lathe and universal milling machine, all of which are to be motor driven and fairly heavy machines. For several weeks the trade has expected a slackening up of business as the result of the taking of inventory, but as yet few sellers have experienced any falling off in demand. Looking ahead, dealers anticipate further purchases by the automotive industry and general buying by the railroads when they are returned to private owners. Railroad business, however, is not as satisfactory from the standpoint of the trade as orders emanating from other sources, as the selling cost to the carriers is high because of the numerous officials who have a hand in purchases. The one cloud in the outlook is the fact that 1920 will be a Presidential election year, and in the past national campaigns have been attended by a slackening in industrial activity.

The expansion of the automotive industry the past year has carried with it a heavy demand for iron and steel products and machine-tool equipment. The local machine-tool trade estimates that from 35 to 50 per cent of its gross sales in 1919 were to automobile, tractor and truck manufacturers. Perhaps the largest new automotive plant erected in this district during the year is the Samson Tractor Works of the General Motors Corporation at Janesville, Wis. Manufacturing facilities there when completed, it is said, will employ 11,000 men. Purchases of machine tools commenced in the fall and are still being made, and although definite information is lacking as to the total appropriation, buying up to date is believed to have exceeded $1,000,000.

Looking to the present rather than into the future, it may be said that dealers have accumulated unusually large backlogs. One important seller has two months business on back order—more than ever before, not excepting the war period. This condition has been accentuated, of course, by the loss in machine-tool output resulting from the curtailment of operation during the coal strike.

There is still considerable talk regarding possible price changes, but as yet the only manufacturer who has definitely announced an advance is a builder of gear hobbers, who will mark up prices abou 10 per cent.

The largest recent purchase in this section was by the Advance-Rumely Co., La Porte, Ind., which bought about $65,000 worth of equipment. To secure prompt delivery, the company canvassed the manufacturers in this district and ordered machines which were available for early shipment.

The F. J. Littell Machine Co. has been incorporated with $35,000 capital stock, $29,500 of which has been paid in, and on Jan. 1 took over all the assets and liabilities of the Acme Machine Works, 4125-27 Ravenswood Avenue, Chicago. The officers are F. J. Littell, president and general manager; Ervin Swangren, vice-president and superintendent of shop; M. E. Wittich, treasurer, and W. N. Stevenson, secretary in charge of engineering department. The company will continue the manufacture of roll feeds, dial feeds and special feeds for punch presses. The management is the same as previously with the exception that E. Swangren, who has been assistant superintendent of the American Can Co.'s Maywood, Ill., shop for several years, takes charge of the manufacturing department as vice-president.

The Joliet Railway Supply Co., 80 East Jackson Boulevard, Chicago, has purchased from the National Malleable Castings Co. vacant property, 725 x 990 ft., at the southwest corner of Ninety-third Street and Greenwood Avenue.

The Stromberg Electric Co., 606 South Michigan Avenue, Chicago, will erect a number of one-story factory buildings on a site, 295 x 628 ft., at the northeast corner of Wrightwood and Greenview avenues.

Merrick A. Richardson, manufacturer of tinware, has awarded a contract for the construction of a six-story addition, 25 x 100 ft., at 1106 Washington Boulevard, Chicago, estimated to cost $50,000.

The Apex Appliance Co., 3223 West Thirtieth Street, Chicago, will reconstruct its two-story plant, which was damaged by fire on Dec. 29. The total loss, estimated at $200,000, was nearly covered by insurance.

Joseph Weidenhoff, manufacturer of automobile supplies, 1219 South Ashland Avenue, Chicago, has had plans prepared for a one-story factory, 125 x 148 ft., to be erected at 4352-58 Roosevelt Road at a cost of $35,000.

The Standard Screen Co., 1858 Hastings Street, Chicago, has let contract for the construction of a three-story factory, 50 x 70 ft., at 1848-52 Hastings Street, to cost $20,000.

The Chicago Coated Board Co., 420 East North Water Street, Chicago, has acquired 80 acres south of the Little Calumet River and east of the Chicago & Western Indiana Railroad tracks, Riverdale, Ill., and contemplates erecting a plant which will ultimately cost $3,000,000.

The R. H. Bloomer Mfg. Co., with a factory at Main and Pearl streets, Council Bluffs, Iowa, has reincorporated with $150,000 capital stock under the style of the Acme Mfg. Co. It plans to build on a new site in the spring and will expand its output of sheet-iron products.

The Cabirange Mfg. Co., manufacturer of stoves, Taylorville, Ill., will remove to Danville, having purchased a plant on East Chandler Street in the latter city, which is being remodeled at a cost of $15,000.

The National Lock Co., Rockford, Ill., is doubling the size of its plant. The total floor space, when its addition is completed, will be 133,000 sq. ft.

The Graver Corporation is the name of the reorganized William Graver Tank Works Co., which located in East Chicago, Ind., in 1888, although originally founded 30 years earlier. It manufactures tanks and also specializes in water softening and purification. The officers of the new corporation are J. P. Graver, president; P. S. Graver, vice-president and general manager; A. M. Graver, vice-president; W. F. Graver, treasurer; H. S. Graver, secretary.

The United States Register Co., 2109-11 Cedar Avenue, Minneapolis, Minn., will build a one-story addition, 40 x 130 ft.

The Berger Mfg. Co., 300 Tenth Avenue, South, Minneapolis, Minn., manufacturer of steel ceilings, etc., plans the construction of a one-story addition to its plant at Ulysses Street and Broadway, 80 x 112 ft., to cost about $50,000.

The Excel Motor Truck Co., Menard Street and Dickens Avenue, Chicago, has filed plans for the erection of a new plant at its present location to cost about $250,000.

The Gramm-Bernstein Motor Truck Co., 2438 South Michigan Avenue, Chicago, has completed plans for the construction of a two-story plant, 70 x 190 ft., on Wabash Avenue, to cost about $150,000.

The Magnet Tractor Co., Minneapolis, Minn., is considering the erection of a new plant adjoining its present works at Central Avenue and Eighteenth Street, N. E., to cost about $100,000. R. D. Jacobson is president.

The Steel Basket Co., Cedar Rapids, Iowa, has leased property at Marysville, Ohio, for the establishment of a new plant.

The Mereen Johnson Machine Co., 4401 Lyndale Avenue, Minneapolis, Minn., has had plans prepared for a one and two-story foundry, 40 x 72 ft. N. M. Nylander is secretary.

Hubbard & Co., 306 South Wabash Avenue, Chicago, manufacturers of hardware and metal products, will build a new plant consisting of six buildings, aggregating 200 x 560 ft. in ground area, at Twelfth Street and Fifty-fourth Avenue, to cost about $350,000.

The Guaranteed Tractors, Inc., Chicago, has filed notice of change of name to the Northern Steel & Iron Co., at the same time increasing its capital from $1,500,000 to $2,500,000.

H. Kramer & Co., 1330 West Twenty-first Street, Chicago, manufacturer of metal products, has had plans prepared for a one-story foundry, 125 x 200 ft.; two-story adjoining building, 30 x 85 ft., and office building to cost about $165,000 including equipment.

The United States Government has purchased the land and the Symington shell works between Seventy-fourth and Seventy-fifth streets, and Robey Street and Ashland Avenue, Chicago, for $235,000. This property will form a part of the arsenal system of the Government.

Milwaukee

MILWAUKEE, Jan. 5.

The first few days of the new year have developed some excellent machine-tool business on which inquiry was put out the last few weeks of 1919. Requests for quotations and delivery dates continue in large volume. Milling machine business is particularly active, the automotive and agricultural implement industries being heavy buyers. Shops are well sold up until April 1 and are steadily advancing delivery guarantees.

The Felker Brothers' Mfg. Co., Marshfield, Wis., manufacturer of steel culverts, stable and general farm appliances and equipment, has awarded contracts for the erection of a brick and steel addition, 100 x 200 ft., and is inquiring for a miscellaneous list of machinery.

The Frost Mfg. Co., Kenosha, Wis., which is erecting additions to its brass foundry and machine shop, has increased its capital stock from $200,000 to $400,000 to finance the construction and equipment as well as the general enlargement of its business. Walter J. Frost is president.

The Federal Rubber Co. of Illinois, with main factories and general offices at Cudahy, is expected to announce soon plans for material enlargement of its plant to supplement additions made the past year.

The Racine Multi-Power Axle Co., Racine, Wis., is a new corporation organized by Robert S. Preble, James E. Shine and M. E. Walker, attorney, to manufacture axles, transmissions, steering gears and other automotive parts. The capital stock is $20,000.

The Automotive Foundry Co., La Crosse, Wis., a new $100,000 corporation, has let the general contract to F. R. Schwalbe & Sons for erecting a brick and steel gray iron shop, 100 x 220 ft., estimated to cost $65,000 complete.

The Nash Sales Co., 455 Broadway, Milwaukee, will build a four-story garage, salesroom and service building, 120 x 120 ft., at Oneida Street and Broadway, to cost about $125,000. Work will begin about March 1. Rudolf Hokanson is general manager.

The Sailor-Whitmore Co., Menasha, Wis., founder and machinist, has let a contract to C. R. Meyer & Sons Co., Oshkosh, Wis., for building an addition to cost $30,000. Some new equipment is being placed.

J. H. Vernet Co., Menominee, Mich., automobile dealer, has plans for a four-story fireproof service building, 60 x 125 ft. The second floor will be equipped as a machine shop, requiring lathes, drill presses, forges and other tools. The total investment is estimated at $50,000.

The United States Switch Co., Eau Claire, Wis., has increased its capital stock from $300,000 to $400,000. It manufactures steel castings and specializes in automatic switches and locks for steam and electric railroads. J. S. Hubbard is general manager.

The Board of Education of Argyle, Wis., has engaged Claude & Starck, architects, Madison, Wis., to design a new high and vocational training school costing about $100,000. Bids will be taken after Feb. 1. L. L. Nelson is clerk.

The Highway Trailer Co., Edgerton, Wis., has increased its authorized capital stock from $180,000 to $500,000. Of the new issue, $100,000 has been sold to finance the construction and equipment of an addition to be ready about Feb. 1.

The Northern Foundry Co., Marinette, Wis., has added a full night shift to cope with orders for gray iron castings from automotive and agricultural implement industries. It has taken a contract to furnish 2000 tons of raw castings to the American Harvester Co., Minneapolis, this year.

Charles H. Stehling & Co., 401 Fourth Street, Milwaukee, manufacturers of tanning and leather machinery, have purchased the gray iron foundry at Cedarburg, Wis., of the Western Rope & Mfg. Co., Tulsa, Okla., which for some time conducted a machine shop in Milwaukee for making gas engines for oil well equipment.

The Board of Education, Oconomowoc, Wis., is taking bids until Feb. 9 for the erection of a $200,000 high school and manual training building, designed by Parkinson & Dockendorff, architects, La Crosse, Wis. H. Kirk White is secretary.

The Necedah Mfg. Co., Necedah, Wis., has been incorporated with a capital stock of $100,000 and will erect a machine shop to produce automotive equipment, parts, accessories, etc. The prime mover is Fred Lederer, Milwaukee, who has been made general manager. Other officers are: President, C. C. Fuller; vice-president, H. C. Rattunde; secretary, W. N. Eaton; treasurer, C. T. O'Brien.

The Dunning Heating Supply Co., 223 Reed Street, Milwaukee, has purchased property at 131-135 Reed Street, providing 25,000 sq. ft. of additional floor space which will be remodeled and equipped for making hot air heating plants and accessories. The enlargement represents an investment of about $75,000.

The Avery Co., Peoria and Milwaukee, has awarded a contract to the Robert L. Reisinger Co., 425 East Water Street, for a one-story addition, 40 x 208 ft., to connect the gray iron foundry and machine shop of the motor works at Fifty-seventh Avenue and Mitchell Street, West Allis.

The Wentink Mfg. Co., Appleton, Wis., has been incorporated with $50,000 capital stock to manufacture metal specialties for pulp and paper mills. A plant will be established in Menasha, Wis. The incorporators are F. C., J. W., and T. E. Wentink, all of Appleton.

The Fulton Co., 1910 St. Paul Avenue, Milwaukee, manufacturer of automotive accessories and equipment, expects to take occupancy of the first unit of its new plant at Scott Street and Seventy-fifth Avenue, in West Allis, about Jan. 15. The group will be 120 x 240 ft., one and two stories, of brick, concrete and steel.

Indianapolis

INDIANAPOLIS, Jan. 5.

The Barber Mfg. Co., Anderson, Ind., manufacturer of bed and other springs, whose plant was recently destroyed by fire, has bought the plant and property of the Spring Steel Fence Co.

The Vonnegut Machinery Co., Indianapolis, will build a warehouse to cost $300,000 on the site of the former plant of the Hetherington & Berner Iron Works, 19-29 West South Street. It will be two stories and basement, 95 x 300 ft. The second floor will be leased for factory purposes. The first floor and basement will provide 60,000 sq. ft. of floor space, for the machine tool, used machinery, machine accessory and rebuilding departments. A 10-ton crane will be installed. Anton Vonnegut is president; Charles A. Rassman, vice-president; F. E. Halleran, secretary, and C. B. Williamson, treasurer.

The Eagle Machine Co., Inc., Indianapolis, manufacturer of tools, jigs and machine fixtures, will establish a branch factory in New York in charge of Charles W. Yount, secretary-treasurer of the company. H. J. Yount is president.

The Sheet Metal Products Co., recently organized at Michigan City, Ind., has purchased the former Granite Brick Co.'s plant, which will be remodeled and equipped.

The Spacke Machine & Tool Co., Indianapolis, has increased its capital stock from $150,000 to $375,000.

The Indiana Die Casting Co., Indianapolis, has changed its name to the National Metal Products Co.

The Whittington-Potts Mfg. Co., Indianapolis, has been incorporated with $10,000 capital stock to manufacture wire fencing. The directors are George W. Whittington, J. Frank Potts and Charles Shaeffer.

The General Electric Co. will start at once the erection of a two-story incandescent lamp factory at Ft. Wayne, Ind. The plant will have 100,000 sq. ft. of floor space.

The Jenkins Vulcan Spring Co., Richmond, Ind., will construct a one and two-story plant, 75 x 400 ft.

The Haywood Foundry Co., Indianapolis, organized by officials of the Haywood Tire & Equipment Co., is planning for the erection of a foundry for the manufacture of iron castings.

The Lafayette Motors Co., Indianapolis, is having plans drawn for a one-story plant in the Mars Hill section, 100 x 1000 ft. McCall White is president.

The Indianapolis Stove Co., 1255 Roosevelt Avenue, Indianapolis, is having plans prepared for a one-story addition to its foundry. Henry W. Bennett is president.

The Robbins Body Corporation, Indianapolis, is putting up new buildings and has also obtained an adjoining building at a total cost of approximately $250,000. It contemplates erecting another building, 80 x 700 ft., four or five stories, but it will depend on the labor and material situation in 1920. So far the company has spent about $25,000 for additional machinery and factory equipment. Unless it puts up additional buildings, very little additional tools and machinery over and above that purchased this year will be required for 1920 production. James A. Daugherty is vice-president and general manager.

Texas

AUSTIN, Jan. 3.

The Bonded Warehouse Association, San Benito, plans to build a pre-cooling plant to cost about $75,000, and to enlarge the capacity of its ice factory.

Permit has been issued to the Lone Star Bed Mfg. Co., Dallas, to build a plant for the manufacture of iron beds, at a cost of $55,000. About 75 men will be employed at the start. J. Klineman is secretary.

The Kepley-Bright Oil Co., with offices in the American Exchange Bank Building, Dallas, and capital stock of $2,500,000, has taken over the holdings of the Cosy Oil Corporation, Oklahoma City, Okla. Later it plans to build one or more refineries.

The Howard Tool Works, Eastland, has been incorporated with a capital stock of $50,000 to manufacture oil field tools. The incorporators are D. M. Howard, P. S. Wolfe and H. L. Durlin, all of Eastland.

The San Antonio Machine & Supply Co., San Antonio, has increased its capital stock from $450,000 to $600,000 and will enlarge its plant.

The American Pneumatic Equipment Corporation, Dallas, has been incorporated with a capital of $250,000. The incorporators are J. C. Colt, F. E. Poindexter and Jack Johnson, all of Dallas.

The Gulf Production Co., Houston, is arranging to build an electric power station and transmission lines in the Goose Creek oil field to cost $500,000, and will use the power to pump its oil wells in that district. The Humble Oil & Refining Company, Houston, will build a similar plant in the Goose Creek field.

The Fort Worth Wheel & Body Mfg. Co., Fort Worth, has been incorporated with a capital stock of $20,000 to manufacture automobile wheels and bodies. The incorporators are G. A. McDonald, A. C. Camp and E. R. Vernon, all of Fort Worth.

The Bexar Rubber Mills, Ltd., San Antonio, has begun excavating for the buildings of its proposed automobile tire manufacturing plant. An expenditure of about $250,000 will be made in erecting and equipping the plant. Don E. Cameron is manager.

The Invader Oil & Refining Co., Fort Worth, has called a stockholders' meeting to be held Jan. 15 for the purpose of authorizing an increase of the capital stock from $2,000,000 to $10,000,000. The additional capital will be used for building a 5000-bbl. refinery at Fort Worth, enlarging its plant at Burkburnett from a daily capacity of 1500 bbl. to 2000 bbl., and other improvements.

The Armstrong Farm Tractor Co. has established offices in Abilene and will immediately construct a plant for the manufacture of farm tractors at a cost of about $500,000.

It is announced that the Crown Oil & Refining Co., Houston, in addition to constructing a refinery with a daily capacity of 5000 bbl. on the ship channel near that city, will build a refinery of 15,000 bbl. daily capacity at Texas City. Steel storage tanks of an aggregate capacity of 1,000,000 bbl. will also be erected.

The Agwi Oil Co., Tampico, Mexico, is assembling materials for the construction of a 30,000-bbl refinery near that port.

The San Antonio Machine & Supply Co., San Antonio, has increased its capital stock from $450,000 to $600,000.

Fire recently destroyed the plant of the Kenedy Oil

Mill Co. and the power plant of the Kenedy Light & Power Co., adjoining, Kenedy, Texas, with loss estimated at $75,000. Both plants are owned by the same interests, headed by John J. Hillje.

California

LOS ANGELES, Dec. 30.

The Hazen Metal Collapsible Shipping Case Co., 205 East First Street, Long Beach, Cal., is considering the erection of a new plant on West Third Street. John Craig is manager.

The Hercules Foundries, Inc., Huntington Park, Cal., has been incorporated with a capital of $500,000 by Robert P. Franck, George T. Franck, San Diego; Arthur R. Adamson and B. M. Wotkyns, Los Angeles, to manufacture iron and steel castings.

The Independent Foundry & Machine Works, Los Angeles, has been incorporated with a capital of $50,000 by T. A. Bateman, A. C. Heltzel and F. M. Keeney, 1201 Girard Street, to manufacture machinery and parts.

The Pacific Insulating & Refrigerating Co., Richmond, Cal., is planning to inaugurate operations in its new plant in this city, recently acquired for a consideration of about $75,000. It has purchased land adjoining the present structure and proposes to erect an addition at an early date.

The United Stamping Mfg. Co., Los Angeles, has filed notice of organization to operate a plant at 1201 East Sixth Street. M. I. Phillips and J. H. Jaffe head the company.

E. O. Miller, 455 American Avenue, Long Beach, Cal., has had plans prepared for a one-story brick machine shop at 427 American Avenue.

The Electrical Products Corporation, 941 West Sixteenth Street, Los Angeles, is having plans prepared for a one-story plant, 65 x 135 ft., with extension 30 x 90 ft., on West Sixteenth, near Burlington Street, for the manufacture of electrical specialties.

The Oro Metal Mfg. Co., Los Angeles, has been incorporated with a capital of $100,000 by Frank E. Jones, James H. Caldwell and Tilman White, to manufacture metal products.

The Western Machinery Co., 900 North Main Street, Los Angeles, has increased its capital from $500,000 to $1,000,000.

The Pacific Gas & Electric Co., San Francisco, has completed plans for the first unit of its proposed new hydro-electric power plant at Big Bend. The work calls for an expenditure of $10,000,000 in the next thirty months, including power plant and machinery.

The United Rubber Co., 336 Second Street, San Francisco, Cal., is contemplating the erection of a new plant to cost about $50,000.

The American Can Co., San Francisco, Cal., has plans under way for the erection of an additional unit at its new plant at Oakland, Cal., to provide a capacity of about 1,000,000 cans a day. The first unit was recently completed, and the entire plant, as designed, will be the largest of any owned by the company.

The Automatic Machine Co., Los Angeles, has filed notice of organization to operate a plant at 808-12 West Sixteenth Street, for the manufacture of machinery and automobile parts. Corbin F. Fitzgerald heads the company.

The Pacific Oil & Land Co., San Francisco, will erect a refinery in Richmond for handling cocoanut oil.

The Pacific Northwest

SEATTLE, Dec. 30.

With an unprecedented demand for lumber, the extreme shortage of freight cars in which to make shipments has forced many mills in this section to close and reduced production in others to far below normal. The State of Washington is receiving less than 50 per cent of its required freight equipment. Due to the car shortage, the price of lumber has gone to unprecedented heights.

The Dayton Lumber Mill Co.'s properties at La Center, Wash., have been purchased by C. A. Button, A. A. Harrison, et al, for $100,000. The new owners will rebuild the mill which was recently destroyed by fire.

W. H. Goodnough, Astoria, Ore., will construct a pulp and paper manufacturing plant to cost about $500,000. A steam plant will also be erected. A site has been secured and construction will begin at once.

The Reedsport Iron Works, Reedsport, Ore., has been incorporated for $25,000 by A. J. Drews, W. Drews and D. A. Smith, and will erect a machine shop and foundry.

Henry Blanke and O. C. Luecke, Eugene, Ore., will equip a hardwood plant at Harrisburg at a cost of $50,000. The J. A. Pattison Lumber Co.'s plant will form the nucleus of the new enterprise.

The G. M. Standifer Shipbuilding Co., Vancouver, Wash., has received contract for three steel tank steamships, each of 12,000 tons capacity.

The Maritime Boat & Engine Co., Seattle, will build a shop for the construction and repair of small boats.

The Lake Union Foundry Co., Seattle, plans the construction of a heavy timbered addition, 40 x 70 ft., to its plant at a cost of $10,000, exclusive of new equipment.

The plant of the Portland Stove Works, Portland, was totally destroyed by fire recently, with an estimated loss of $250,000.

The Britannia Wire Co., Vancouver, B. C., plans the erection of a rope manufacturing plant, 120 x 200 ft., on Industrial Island, to cost $100,000.

The Wahkeena Furniture Mfg. Co., Portland, has been incorporated and will establish a plant for the manufacture of furniture and wood and metal articles. H. C. Long heads the company.

It is reported that George F. Whalen, Vancouver, B. C., will erect a paper plant capable of handling 10,000 tons of pulp annually, at Port Angeles, Wash., and has organized the Washington Pulp & Paper Corporation with $4,000,000 capital stock.

Moran Brothers, Seattle, will construct a two-story, heavy-timbered foundry and machine shop, 60 x 148 ft., costing $7,000.

The Yakima County Horticultural Union, Yakima, Wash., will erect an addition to its cold storage plant, at a cost of $100,000. Machinery installation is estimated at $50,000.

Canada

TORONTO, Jan. 5.

According to machine-tool dealers little relief is in sight for Canadian manufacturers in need of machinery and tools. Considerable business is being placed for delivery the latter part of the year and in some cases orders have been received for delivery as late as December, 1920. Dealers are now unable to give a definite date as to when deliveries can be made and as a consequence a thriving business is being done in rebuilt equipment. The Canadian Cartridge Co., Ltd., Hamilton, Ont., has issued a long list of tools, etc., of which it is desirous of disposing. It includes 20 presses; 60 lathes; 9 grinders; 15 furnaces; 15 blowers and fans; 10 motors, as well as a large number of milling machines, drills, shears and various other equipment.

T. McAvity & Sons, Ltd., Box 700, St. John, N. B., is in the market for one photostat machine. The plant of the Motor Trucks, Ltd., Brantford, Ont., is being cleared to make room for the installation of equipment for the manufacture of washing machines, etc., machinery for which is being purchased. The Robb Engineering Works, Amherst, N. S., will go into the manufacture of the Baker-Robb farm tractor on a larger scale and will also extend its manufacture of water tube boilers. The company is ordering new equipment to take care of its increasing business. The Preston Woodworking Machinery Co., Preston, Ont., will shortly complete an addition to its plant and is in the market for a 36-in. boring mill or equal.

The National Steel Car Corporation, Ltd., recently organized, has taken over the plant, business, liabilities and assets of the National Steel Car Co., Hamilton, Ont., and will continue the manufacture of railroad cars. The capacity of the motor truck department will be greatly increased. R. J. Magor is president.

J. A. Rousseau, St. Anne de la Perade, is looking for a site at Cap De La Madeleine, Que., for the erection of a sawmill to cost $100,000. Equipment will be purchased.

Albert Kahn, architect, Marquette Building, Detroit, is preparing plans for the erection of a reinforced concrete factory and power house at Windsor, Ont., for the Burroughs Adding Machine Co., to cost $250,000.

Blatz Brothers, 187 Charlton Avenue East, Hamilton, Ont., have the general contract for the erection of a factory at Brampton, Ont., to cost $25,000, for the Universal Batteries, Ltd.

Beaumont & Boulanger have the general contract for the erection of a factory addition costing $30,000 for the Agricultural Machinery Co., Montmagny, Que.

Contracts have been let and work is under way on the erection of a factory costing $50,000 for the Anglo-Canadian Wire Works, Ltd., Montreal.

The Western Wheel & Foundries, Ltd., St. Boniface, Man., has been incorporated with a capital stock of $2,000,000 by John A. McVicar; Albert T. Hawley, Norman J. D'Arcy and others, all of Winnipeg, Man., to manufacture engines, machinery, car wheels, etc. The company is establishing a manufacturing plant in the city.

NEW TRADE PUBLICATIONS

Automatic Wire Spring Machinery.—Sleeper & Hartley, Inc., Worcester, Mass. A series of bulletins illustrating and describing automatic wire spring machinery as follows: Bulletin No. 101, universal wire spring coiling machines; No. 252, helical bed spring coiling machine; No. 264, spring setting machines; No. 268, helical cutting and hooking machine; No. 269, wire nail machinery; No. 270, torsion spring machines; No. 275, wire rolling and flattening mill; No. 277, spring hooking machines; No. 280, special spring coilers; No. 287, furniture spring coiler; No. 308, flexible shaft coiling machines; No. 309, flexible metallic tubing coilers; No. 317, furniture spring knotting machine; No. 319, flexible casing coiler; No. 334, wire straightening and cutting machines; No. 350, nail die grinding machine; No 351, wire reels; No. 372, staple machines.

Quadrant Electrometer.—Pyrolectric Instrument Co., 636 East State Street, Trenton. Bulletin No. 8. A brief description of the advantages and methods of use of the quadrant electrometer, designed for measuring small electric currents or for measuring small potential differences in cases where the supply of electric current is limited. The bulletin is illustrated.

Mill Supplies and Hardware Specialties.—Greene, Tweed & Co., 109 Duane Street, New York. Catalog 12, 64 pages, 6½ x 9¾ in. Devoted to a line of mill supply and hardware specialties and general mill supplies, including such items as belt studs, tools for wire belt lacing, belt fasteners, belt lacing, self-lubricating packing, twist packing, gasket tubing, chain pipe wrenches, ratchet wrenches, rawhide hammers, speed indicators, automatic lubricators, water hose, hose clamps, hose reels, walrus leather, buffalo leather, leather polishing wheels, etc.

Extinguishing Oil Fires.—Foamite Firefoam Co., 200 Fifth Avenue, New York. Bulletins, Nos. 1 to 12, inclusive, devoted to reports of oil fires which were extinguished by the use of the Foamite system.

Heat Treated Gearing.—R. D. Nuttall Co., Pittsburgh. Bulletin 25, 24 pages, 6 x 9 in. Explains the heat treatment of gears and discusses the items making for long life of gears, such as lubrication and alignment. Photomicrographs of steel that had undergone different heat-treating processes, and examples of the excessive wear on gears not properly aligned, are shown.

Pneumatic Machinery.—Curtis Pneumatic Machinery Co., St. Louis. Catalog 63, 84 pages, 6 x 8¾ in. Illustrates and describes an extensive line of air compressors, air hoists, trolleys and trolley systems, sand blasts, pneumatic and hydro-pneumatic elevators, jib and travelling cranes.

Drop Forgings and Tools.—J. H. Williams & Co., Brooklyn, N. Y. Catalog, 150 pages, 4 x 6 in. Illustrates and describes the company's line of drop-forged tools and standard drop-forged stock specialties. Several new lines of goods include "Agrippa" turning-tool holders, set screw pattern; "Agrippa" boring-tool posts; "Vulcan" forged-cutter tool holders, and several new assortments or sets of drop-forged wrenches. A description of the drop-forging process is included.

Metal-working Machinery.—Allied Machinery Co. of America, 51 Chambers Street, New York. Catalog, 8½ x 11 in. Illustrates and describes standard engine lathes with straight or gap beds for use both in the small shop and in general manufacturing, made by the South Bend Lathe Works, South Bend, Ind.; turret lathes and screw machines manufactured by the Warner & Swasey Co., Cleveland, Ohio; high duty milling machines manufactured by Gooley & Edlund, Inc., Cortland, N. Y.; small duplex milling machines for horizontal and vertical milling manufactured by Chicago Machine Tool Co., Chicago, Ill.; brass working machines, valve seating, valve milling, automatic boring and tapping machines, cock grinders and key lathes for brass and cast-iron work manufactured by the Warner & Swasey Co., Cleveland, Ohio.

Circular Saws.—Huther Brothers Saw Mfg. Co., Rochester, N. Y. Catalog, 93 pages, 5 x 6½ in. Lists and illustrates an extensive line of circular saws, such as solid tooth, inserted tooth, groover head, matcher cutters, cross-cut saws, rip saws, cutter head, band saws, hack saws, etc., also saw swages, saw filing machines, saw setting machines, etc.

Centrifugal Pumping Machinery.—Lea-Courtenay Co., Newark, N. J. Bulletin H-4, 67 pages, 6 x 9 in. Discusses the company's testing facilities, gives details of pump design and construction, and describes various types and sizes of the company's centrifugal pumps and their application. These include single-stage pumps for low and moderate heads, single-suction uniflow pumps, single-section multi-stage pumps and centrifugal fire pumps. The catalog is profusely illustrated and tables and data of interest to engineers are included.

Centrifugal Pump Sales Service Data.—Goulds Mfg. Co., Seneca Falls, N. Y. Bulletin 122, 35 pages, 7¾ x 10 in., with the title "Centrifugal Pump Sales Service Data." This data, originally issued in a series of sales letters for use in the company's organization, gives information on the theory, designs, testing, etc., of centrifugal pumps.

Vapor Heating.—Trane Co., La Crosse, Wis. Bulletin 10. Describes the company's vapor heating system as applied to projects using radiator traps and direct return traps, and involving installations of more than 400 sq. ft. of radiation. Illustrations are included.

Electrical Precision Instruments.—Pyrolectric Instrument Co., Trenton, N. J. Catalog, 40 pages, 8 x 10½ in. Lists, illustrates and describes Northrup pyrovolter, pyrovolter adapter, continuously deflecting pyrovolter, Northrup millivolter, Northrup microvolter, thermocouples and accessory pyrometer equipment. The pyrovolter type instrument is explained as indicating the voltage without extracting any current from the source of the e.m.f. being measured.

Rectangular Magnets.—Cutler-Hammer Mfg. Co., Milwaukee. Booklet J. Illustrates and describes the company's rectangular magnets for the handling of regular shapes in steel and iron. The construction is explained, lifting capacities for various classes of material are given and a few typical applications are shown. This type of magnet used for this class of work is explained as giving the maximum lifting capacity for given weight of magnet, resulting in economy in the price of the magnet, crane equipment and current consumption, and often times greater speed in handling material.

Helical Gearing in Electric Railway Service.—R. D. Nuttall Co., Pittsburgh, Pa. Bulletin 26. Discusses helical gearing in electric railway service. An analysis of spur gear performance and helical gear service is given, and shock and vibration and the effects of gears on other parts of the equipment are discussed. A large portion of the bulletin is devoted to a conversation between a plant superintendent, general manager and Mr. Nuttall which points out the advantages of helical gearing in electric railway service.

Calendars.—Cleveland Brass & Copper Mills, Inc., Cleveland. Size 13 x 32 in. Consists of 12 sheets each showing a three months calendar printed with black numerals on a yellow background, with the exception of the current month, which has Sundays and legal holidays differentiated with red numerals. An 11-in. space at the top of each sheet bears the company's name, gives a list of products, names of principal officers and branch offices.

Dearborn Chemical Co., 299 Broadway, New York, and 332 South Michigan Avenue, Chicago. Size 20 x 27 in. Consists of 12 sheets, each having a one months calendar with black numerals on a white background and with Sundays and legal holidays in red numerals. The upper half of the sheets show views of the company's buildings, laboratories and various departments.

Ernest Law & Co., Harrison Building, Fifteenth and Market streets, Philadelphia. Size 11 x 14 in. The calendar pad is 8 x 11 in., has 12 pages with a one months calendar on each page printed with green numerals on a cream background. The border around the calendar pad is black and gold.

Gardner Governor Co., South Front Street, Quincy, Ill. Size 12 x 18 in. Consists of 12 sheets each bearing a one months calendar, 8½ x 4½ in., with black numerals on a cream background. On the upper half of each sheet is shown a view of one of the company's products, such as compressors, vacuum pumps, plunger pumps, etc.

Cleveland Punch & Shear Works Co., Cleveland. Size 7 x 10 in. Sheets each bear a weekly calendar, 3½ x 2 in., with Sunday omitted, printed with blue numerals on a white background. The sheets have a blue background and show views of machines manufactured, such as punches, shears, etc., also various tools.

National Safety Council, 168 North Michigan Avenue, Chicago. Size 11 x 18 in. Consists of 12 sheets, each bearing a one months' calendar, 11 x 6 in., with blue numerals on a white background and with legal holidays in red numerals. The upper half of each sheet pictorially illustrates, in a humorous vein, various hazards to life and limb.

Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general headings of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes

	Per lb.
Bars:	
Refined iron, base price	4.00c. to 4.25c.
Swedish bars, base price	20.00c.
Soft Steel:	
¾ to 1⅞ in., round and square	3.52c. to 4.00c.
1 to 6 in. x ⅜ to 1 in.	3.52c. to 4.00c.
1 to 6 in. x ¼ to 5/16	3.62c. to 4.00c.
Rods—⅝ and 11/16	3.42c. to 4.00c.
Bands—1½ to 6 by 3/16 to No. 8	4.22c. to 4.75c.
Hoops	4.47c. to 5.50c.
Shapes:	
Beams and channels—3 to 15 in.	3.47c. to 3.75c.
Angles:	
3 in. x ¼ in. and larger	3.47c.
3 in. x 3/16 in. and ⅛ in.	3.72c. to 3.97c.
1½ to 2½ in. x ⅛ in.	3.52c. to 3.77c.
1½ to 2¾ in. x 3/16 in. and thicker	3.47c. to 3.72c.
1 to 1¼ in. x 3/16 in.	3.52c. to 4.45c.
1 to 1¼ x ⅛ in.	3.57c. to 4.50c.
⅞ x ⅞ x ⅛ in.	3.62c. to 3.87c.
¾ x ⅛ in.	3.67c. to 3.92c.
⅝ x ⅛ in.	4.07c. to 4.72c.
½ x 3/32 in.	5.17c. to 5.42c.
Tees:	
1 x ⅛ in.	3.87c. to 4.12c.
1¼ in. x 1¼ x 3/16 in.	3.77c. to 4.02c.
1½ to 2½ x ¼ in.	3.57c. to 3.82c.
1½ to 2½ x 3/16 in.	3.57c. to 3.82c.
3 in. and larger	3.52c. to 3.80c.

Merchant Steel

	Per lb.
Tire, 1½ x ½ in. and larger	3.52c.
Toe calk, ½ x ⅝ in. and larger	4.35c.
Open-hearth spring steel	7.00c.
Standard cast steel, base price	14.00c.
Extra cast steel	18.00 to 20.00c.
Special cast steel	23.00 to 25.00c.

Tank Plates—Steel

	Per lb.
¼ in. and heavier	3.67c. to 4.00c.

Sheets

Blue Annealed

	Per lb.
No. 10	5.07c. to 5.80c.
No. 12	5.12c. to 5.85c.
No. 14	5.17c. to 5.90c.
No. 16	5.27c. to 6.00c.

Box Annealed—Black

	Soft Steel C. R., One Pass, per lb.	Wood's Refined, per lb.
Nos. 18 to 20	6.05c. to 6.80c.	
Nos. 22 and 24	6.10c. to 6.85c.	7.80c.
No. 26	6.15c. to 6.90c.	7.85c.
No. 28	6.25c. to 7.00c.	8.00c.
No. 30	6.35c. to 7.20c.	

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per lb.
No. 14	6.50c. to 8.10c.
No. 16	6.75c. to 8.25c.
Nos. 18 and 20	6.90c. to 8.40c.
Nos. 22 and 24	7.05c. to 8.55c.
No. 26	7.20c. to 8.70c.
No. 27	7.35c. to 8.85c.
No. 28	7.50c. to 9.00c.
No. 30	8.00c. to 9.50c.

No. 28, 36 in. wide, 20c. higher.

Corrugated Roofing, Galvanized

2½ in. corrugations, 10c. per 100 lb. over flat sheets.

Steel Wire

Base Price* on No. 9 Gage and Coarser	Per lb.
Bright basic	7.50c.
Annealed soft	7.50c.
Galvanized annealed	8.00c.
Coppered basic	8.00c.
Tinned soft Bessemer	9.50c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

Base Price	
High Brass Sheet	27½c. to 28½c.
High Brass Wire	27½c. to 28½c.
Brass Rod	25¾c. to 28 c.
Brass Tube	41½c. to 43 c.

Copper Sheets

Sheet copper, hot rolled, 16 oz., 32c. per lb. base.

Cold rolled, 14 oz. and heavier, 1½c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14x20		
			Primes	Wasters
Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	80 lb.	$8.80	$8.55
		90 lb.	8.90	8.65
		100 lb.	9.00	8.75
IC $15.00	$13.00	IC	9.25	9.00
IX 17.25	15.00	IX	10.25	10.00
IXX 19.00	16.75	IXX	11.25	11.00
IXXX 20.75	18.50	IXXX	12.25	12.00
IXXXX 22.25	20.25	IXXXX	13.25	13.00

Terne Plates

8-lb. Coating 14x20

100 lb.	$9.35
IC	9.50
IX	10.50
Fire door stock	12.75

Tin

Straits pig	63c. to 65c.
Bar	68c. to 75c.
American pig, 99 per cent	57½c. to 59c.

Copper

Lake Ingot	22c. to 23c.
Electrolytic	21c. to 22c.
Casting	20½c. to 21c.

Spelter and Sheet Zinc

Western spelter	10c. to 11c.
Sheet zinc, No. 9 base, casks	13c.; open 14c.

Lead and Solder*

American pig lead	9c. to 10c.
Bar lead	10c. to 11c.
Solder ½ and ½ guaranteed	40½c.
No. 1 solder	37c.
Refined solder	33c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	90c.
Commercial grade, per lb.	50c.

Antimony

Asiatic	11c. to 12c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb. 35c. to 38c.

Old Metals

The market is firm. Dealers' buying prices are nominally as follows:

	Cents Per lb.
Copper, heavy and crucible	17.00
Copper, heavy and wire	16.00
Copper, light and bottoms	14.00
Brass, heavy	10.50
Brass, light	7.50
Heavy machine composition	15.75
No. 1 yellow rod brass turnings	9.50
No. 1 red brass or composition turnings	12.50
Lead, heavy	6.25
Lead, tea	4.25
Zinc	5.00